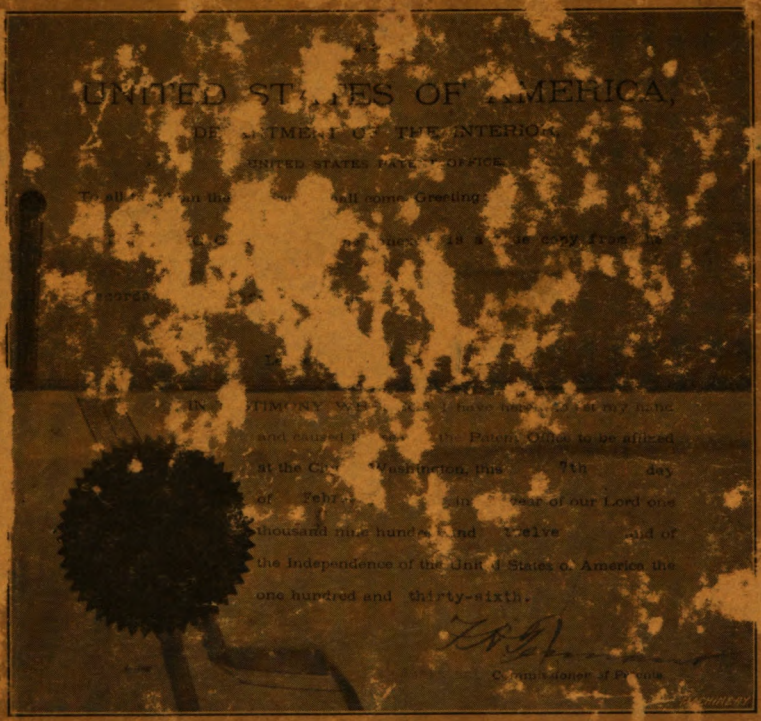
UC-NRLF
B 3 018 846
TJ 7 M3 v.134

25 CENTS

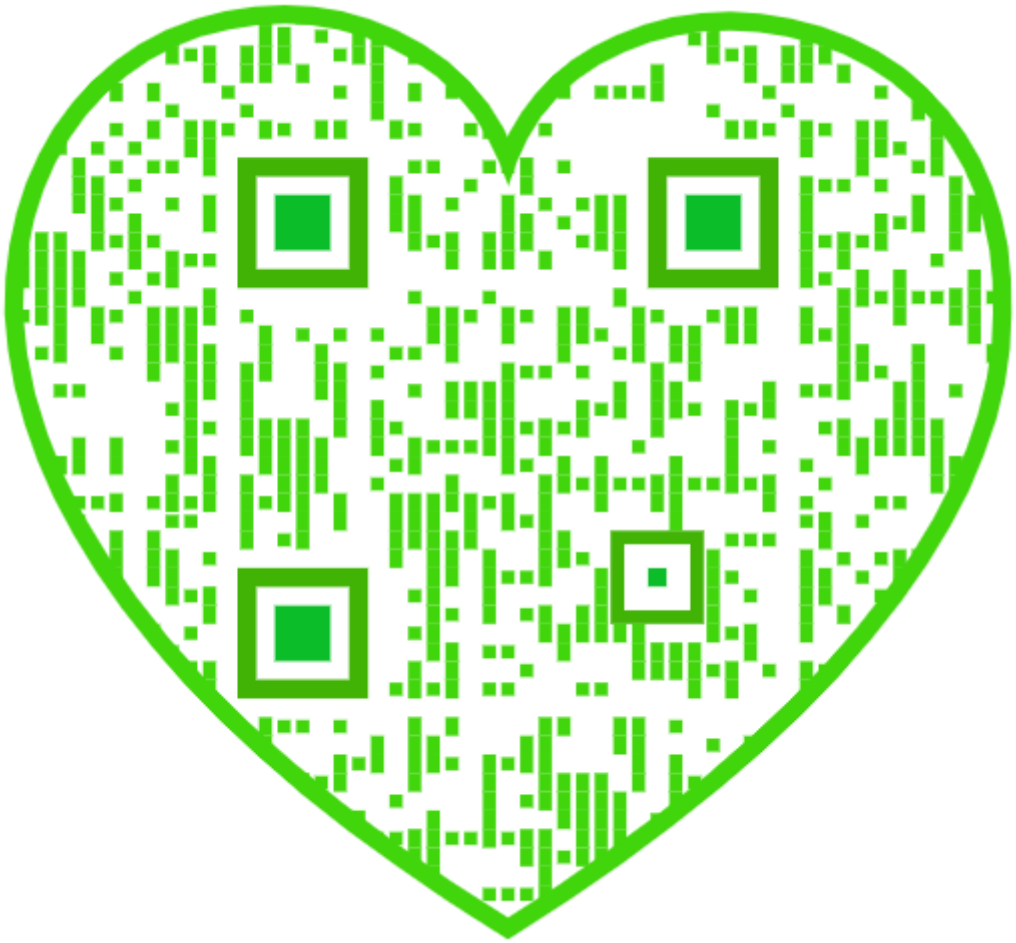
PATENTS

PRINCIPAL PROVISIONS OF THE PATENT LAW
PROCEDURE IN OBTAINING PATENTS
INFRINGEMENT OF PATENTS


UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.
To all to whom these Letters Patent shall come, Greeting:
IN TESTIMONY WHEREOF I have hereunto set my hand and caused the Seal of the Patent Office to be affixed, at the City of Washington, this 7th day of February in the year of our Lord one thousand nine hundred and twelve and of the Independence of the United States of America the one hundred and thirty-sixth.
Commissioner of Patents.

MACHINERY'S REFERENCE BOOK NO. 134
PUBLISHED BY MACHINERY, NEW YORK

YC 53944



MACHINERY'S REFERENCE SERIES

EACH NUMBER IS ONE UNIT IN A COMPLETE LIBRARY OF MACHINE DESIGN AND SHOP PRACTICE REVISED AND REPUBLISHED FROM MACHINERY

NUMBER 134

PATENTS

CONTENTS

General Principles of Patents - - - - - - - 3

Essentials of the Patent Law - - - - - - - - 16

Actual and Constructive Patent Infringement, by E. D. SEWALL - - - - - - - - - - - - - 33

Copyright, 1914, The Industrial Press, Publishers of MACHINERY, 140-148 Lafayette Street, New York City

TJ7
M3
v.134

PREFACE

In the following chapters has been given a general review of the requirements of the patent law, many of the provisions of which, in their legal form, may be rather obscure to the average lay reader. These provisions have been explained in a popular manner, and numerous examples of the working of the patent laws have been given. In preparing the first two chapters, material has been drawn from a great many sources, and especially from articles published on the subject of Patents in MACHINERY. It has been impossible to give credit to each individual contributor of material on account of the revision, coordination and rearrangement that has been made of the original articles, but it should be mentioned that the main portions of Chapters I and II are made up largely from articles written and addresses presented by F. W. Harris, E. R. Miner, Dyer Smith, E. C. Smith and F. W. Winter. The subject of patents and patent applications has been dealt with exhaustively in MACHINERY, and the most important portions of the material published have been collected in this Reference Book.

CHAPTER I

GENERAL PRINCIPLES OF PATENTS

Most engineers, designers and mechanics will find it of great practical advantage to know something about patents and the elements of patent law; and the present treatise has been prepared with the object in view of giving some practical information on this subject. An experience of several years in charge of a corporation patent department brought the author in touch with different inventors, and indicated to him that many did not understand what constitutes an invention, or the nature of a patent. To establish an exact definition of invention, that shall serve under all conditions to distinguish invention from mere resource or skill, is practically impossible. The problem has taxed our best jurists, who have been unable to deduce a formula universally applicable under all conditions. In general, however, pure or genetic invention is creation. The phonograph, air brake, "universal" system of winding, are all good examples of genetic invention—the products of the inventor's creative genius.

Subordinate to this is what may be termed constructive invention, or the invention of development and improvement. One man conceived and reduced to practice the mechanism for reproducing human speech—a genetic invention. He and others have made contributory inventions of constructive revision. The origination of the talking machine has stimulated constructive thought in an entirely new field of activity, and thereby the original device has been modified by changes and additions which may or may not have been improvements. Unfortunately, too much of constructive invention is not stimulated by a desire to better an existing invention, but arises from predatory motives and is directed to "getting around it." Because of this fact, such inventive acts are best termed "circumventions," which word best expresses their piratical spirit.

Nature of a Patent

A patent is a contract between the public, by its representative, the government, and the patentee; and the patent document is evidence of proprietary rights, duly recorded. The applicant alleges that he has invented something new and useful; provided his allegation is true, the public will accord him exclusive rights in and to his invention for a period of years. At the patent office are maintained extensive records of patented inventions, both domestic and foreign, and a patent is issued only after due investigation and comparison of the application with these records, and provided the invention is not found in the prior act or in some application pending before the patent office, and provided that no fraud has been detected in the

347598

preparation or prosecution of the application. Having secured his patent, the inventor has attained two things, *viz:* a more or less uncertain asset on which he may or may not raise money, and a status or basis for suit before the courts. The law provides no guarantee of the validity of the invention, nor does it provide any penalty for infringement. It provides means for securing just treatment and damages in case of injury by infringement. Judge Colt stated the position of patent litigation very clearly in Boston several years ago. Speaking for the Appellate Court, in a refusal to entertain discussion of some "legal precedents," he said, in substance, "Cases of this character (patent cases) are not matters of law, but of equity; and equity, in plain English, is simply that which is right and just between parties."

Limitations of Patent Rights

Probably the most disconcerting experience to the inexperienced inventor is the securing of a patent with its crisp parchment, ribbons and seal, and attendant cost, only to find that the invention, although "new and useful," cannot be practiced because dominated by some existing patent. Possibly the dominating patent was disclosed among the first references cited by the examiner, but because it did not show precisely the same form of construction as his own, and he did not find the broad, basic claim, and because he did not understand the law of equivalents, the inventor proceeded with his case supposing he could use his own peculiar construction. An exceptionally clear illustration of the principle of "domination" appeared in a little advertising pamphlet issued by an attorney several years ago. Assume that percussion firearms are unknown. X invents the first percussion device comprising a hammer. He applies for a patent and secures, by broad, basic claims, the sole right to make, use or vend firearms that have hammers. Y sees the disadvantage and danger of employing only a hammer, and invents the trigger, and he also secures, by patent, sole rights, title and privilege in the manufacture, use and sale of firearms of which a trigger is a component. But the trigger is dependent on the hammer for its usefulness, and as X has sole right to the manufacture of guns with hammers, Y's invention is useless unless he can sell his patent to X, or induce him to use the triggers on a royalty basis, or can secure on a similar basis the right to make guns with hammers, under X's patent, or can manufacture trigger attachments for use on guns manufactured by X. Unaware of this, many would-be inventors, unacquainted with a given field of activity, attempt, without any canvass, to devise some supposed improvement, and proceed to seek a patent.

Comparative Value of Patents

The point just touched upon deserves more and detailed consideration. There are no questions in relation to patents more important than those which deal with their commercial value. Practically all patents are applied for with the idea of making profits, and

the value of a patent is the one great question in which every inventor is interested. The following paragraphs are intended to indicate how an approximate value of a patent may be arrived at. It may be said in the beginning that there is a popular misconception of the true meaning of the grant of letters patent. In the popular mind a patent is a license for the inventor to build the thing disclosed in the drawing and the specification, and, further, a legal bar to prevent others from building, making or using that thing. These, to the popular mind, are the purposes of a patent—first, to allow the inventor to use, and second, to prevent everyone else from making or using the invention.

The first of these, that is, the license purpose, is not the intention of the patent. The law does not contemplate licensing an inventor. It merely contemplates giving him a monopoly; that is, he can stop others from making, renting or using the invention claimed in his

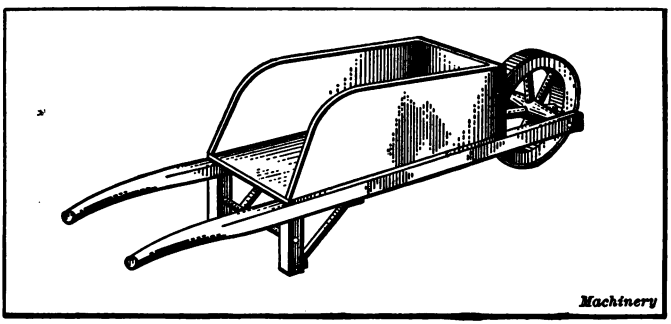


Fig. 1. Wheelbarrow as covered by Jones' Patent, used as an Example to illustrate Fundamental Principles of Patent Law

patent; but whether he can do so himself or not depends on several things. This and the points to follow can best be illustrated by specific cases. For example, let us assume that no one has ever invented a common wheelbarrow and that Jonas Jones has a patent on it, as illustrated by Fig. 1. Let us further suppose that he has claims as follows:

1. A barrow comprising a load-holding means, wheel means at the forward end thereof, and handle means at the rear end thereof.

2. A barrow comprising a load-holding body, a wheel supporting the forward end of said body, legs supporting the rear end of said body, and handles by which the rear end of said body may be raised.

3. A barrow comprising two handle members having handles formed on one end thereof, a wheel supported between the other ends of said handle members, a rectangular body supported on said handle members, and legs extending downwardly from the said handle members.

Let us further suppose that Jones was clearly entitled to these claims and that his invention is the very first that even remotely resembles a wheelbarrow. In this case the government has given

him a broad patent and one that is difficult to avoid infringing. Claim (1) is very broad, covering as it does the combination of any sort of a load-holding means, any sort of wheel means at the forward end of the load-holding means, and handle means at the other end of the load-holding means. While it could be avoided by placing the wheel and the handles on the same end or by omitting one of the three elements named, it is evident that if this is done we will not have a wheelbarrow. It will be noted that this claim does not specify any legs. Nevertheless it cannot be avoided by adding legs. In other words, if the three elements specified in the claim are used for the same purpose and in the relation specified in the claim, the claim cannot be avoided by adding another element.

Let us now suppose that Bronson Brown invents the wheelbarrow shown in Fig. 2 after Jones has obtained his patent. The patent office would grant claims about as follows:

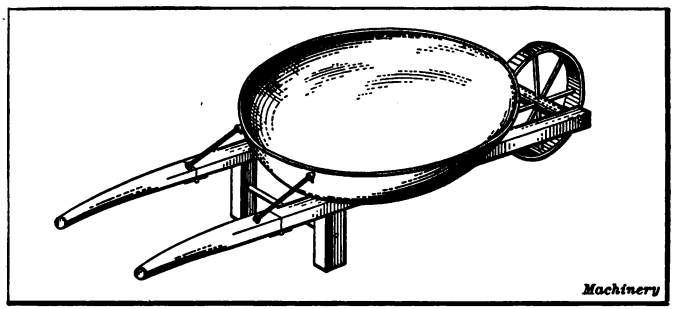


Fig. 2. Wheelbarrow covered by Brown's Subsequent Patent

1 A. A barrow comprising a saucer-shaped metal load-holding means, wheel means at the forward end thereof, and handle means at the rear end thereof.

2 A. A barrow comprising a load-holding means, wheel means at the forward end thereof, hinged handles at the rear end thereof, and locking braces for said handles.

To the average person it would seem that Brown, having a patent which describes and claims a certain type of wheelbarrow, should be entitled to make, use and sell that wheelbarrow. As a matter of fact the issue of the patent has not affected Brown's rights to make, use and sell in the slightest degree. His invention contains all the elements of the first claim of Jones and clearly infringes it. In other words, he has absolutely no right to make it until the Jones' patent runs out.

His patent simply grants him a right to prevent others from making the structure claimed. An examination of Claim (1A) discloses that it is like Claim (1) except that it specifies a "saucer-shaped metal load-holding means." The claim grants to Brown the sole right to use such a load-holding means. Now Jones can prevent Brown from making any kind of a wheelbarrow, but Brown can prevent Jones

from using his peculiar type of load holder. The patent to Jones is broad or generic, while the patent to Brown is narrow or specific. If no patent had ever been granted to Jones and the wheelbarrow shown in Fig. 2 was the first of its class Claim (1) could have been granted thereon as well as upon the wheelbarrow shown in Fig. 1. If, however, Brown's attorney were incompetent. and asked only for Claims (1A) and (2A), these would be all the claims Brown would get. In this case any one could build the wheelbarrow shown in Fig. 1, as this neither has the "saucer-shaped load-holding means of Claim (1A), nor the "hinged handles" of Claim (2A). In this case Brown would have lost a valuable invention due to having a poor attorney.

In the same manner Claim (3) of Jones' patent specifies "a rectangular body supported on said handle members." If Jones had no broader claim that this, he could not stop Brown from making a body not rectangular, nor could he stop any one from doing this or from making a body supported otherwise than on the handle members. In other words, if Jones had only Claim (3) he would have a narrow, specific patent in the place of a broad generic one.

A patent covers what it claims, not what it shows. Every claim is a patent in itself and may be sued on and adjudicated quite apart from the remaining claims. Each claim consists of a combination of several elements modified by limiting clauses. Omitting one of the elements from a structure avoids that claim so long as an equivalent element is not added in its place. This is the general theory of claims.

Claims are, however, interpreted by the courts in the light of what has gone before. If, for example, Jones had antedated Brown by several years, and was clearly the first inventor of any sort of a wheelbarrow, the courts would not attach much importance to the "rectangular" in Claim (3). It might be argued that this distinction was immaterial and that the word had slipped in inadvertently. If, however, wheelbarrows like Fig. 2 were already known, it would be evident that Jones must limit himself to rectangular bodies to have a valid claim, and that the word "rectangular" would be essential and not inadvertent. The courts will also consider various collateral circumstances, such as the relation of Jones and Brown and the utility and value of the invention at issue. For this reason the wording of claims is not always conclusive, but in general the rule is as stated.

Having now a certain patent, we wish to know its value. Let us suppose that Brown's patent is to be examined to determine its value, and let us further suppose that we know nothing of Jones' wheelbarrow. How shall we arrive at the value of Brown's patent?

The first thing is to determine the prior state of the art at the time Brown applied for a patent. This can be done by having the patent office make a typewritten copy of the file-wrapper and contents, and send them to us with the references to prior patents found and cited by the examiner in the prosecution of the case. We can then carefully review the case, see what claims Brown made originally and

what claims he had to cancel and abandon. We can see further just what the prior patents were with which he had trouble. If the case is very important we may send for file-wrappers and contents on some or all of these prior patents and study them. Further, we would go ourselves to the patent office and search the records for patents that the examiner did not regard as pertinent or overlooked in his search. This would all take time, but would result in a clear conception as to exactly what Brown was entitled to when he applied.

The claims in the Brown patent are then studied to see what the elements of the combination are, and to see if one or more cannot be omitted and yet have a commercial device. If one of these elements is not absolutely essential or if a limiting clause is present which may be omitted without hurting the article it is sought to manufacture, it may be at once said that the patent is of little or no value. Many patents are valueless on their face due to limiting clauses therein or to elements that are not essential. Many others are valueless because they are dominated by earlier and broader patents. The search in the patent office and the study of the data collected should disclose these broader patents if any exist. It may be said, however, that there is no sure way to find absolutely all the prior patents that may affect the right to manufacture an article. This is due partly to the fact that a claim for a collection of elements used, for example, in a wheelbarrow, may be found in a wagon, a railroad car or an aeroplane patent. An inventor may be sure that he cannot manufacture an article due to a prior patent, but he can never be sure that he is not infringing the rights of someone else.

Strictly speaking, the only way to determine a patent's value is to submit it to a lawsuit. After a patent has been passed upon by a Federal court and has stood the test of litigation its value may be said to be fixed. This is very expensive and slow, and no business man wants to wait for such action by the courts. There is no reason, however, why a competent patent lawyer cannot arrive very closely at a patent's value at a very moderate expense. Certainly, no one should pay for patent rights or embark in a business based wholly or in part on patent rights without first getting such an opinion.

Inventions that Are Merely New Applications

There are many would-be inventors who waste time with what they wrongly dignify as an invention, by applying a device invented for one purpose to some other purpose. This is done many times in a belief that the various classifications in the patent office are distinct fields of enterprise, and that the importation of an invention from one to another is as patentable as the original creation and development. Generally speaking, a patent protects its invention in all its uses, though there are exceptions when the work of adaptation involves distinct inventive ability, which is recognized. For those who study and analyze, securing information regarding the field in which they propose to work, there is ample opportunity in the realm of con-

structive invention. The field of purely genetic invention is becoming rapidly more limited, and patent values are differentiated on narrower margins of constructional difference. This is as it should be, because minor constructional variations are frequently productive of large commercial results. As a matter of fact, the inventor has exceptional privileges and opportunities under our patent system. If he elects to prosecute his own patent application, he may do so, bound by no fine technicalities, and, for his guidance, he is provided gratuitously by the patent office with one of the most complete, and clearest compilations of rules and directions, clearly illustrated and supplied with skeleton forms for any and all possible actions.

Should an Inventor Prosecute his own Case?

It is true that many inventors successfully prosecute their own cases, and it is likewise true that many professional attorneys are pitifully incompetent. Nevertheless it is also true, that just as some individuals find best expression for their abilities in mechanical conceptions, some in mechanical construction, and some in the commercial exploitation of mechanical products, so others, peculiarly able because of their command of language and resourcefulness of apt expression, can best reduce the inventor's conceptions to record form. If, however, the inventor would exercise the same diligence in delving into the realm of invention that the average business man exercises in his conduct of affairs, he would avoid many pitfalls, and his passage through what is usually pictured as a veritable slough of despond would be more expeditious and less gloomy.

Many patents are valueless, not because the inventor did not have a meritorious invention, but because he allowed a poor lawyer to give away his rights. There is nothing more pathetic than a good invention poorly protected. The inventor has disclosed his invention to the public, he has fully explained and illustrated it as required by law, and he has obtained in exchange a claim or collection of claims which is easily avoided or which will be declared invalid by the first court called upon to pass on it. This is almost always due to the incompetence of the attorney who handled the case. The patent office is generally fair, but it will not give an inventor any more than he asks for, and if his attorney is satisfied with poor claims, that is what he will get. It is, of course, sometimes possible to surrender such a poor patent and take a re-issue that adequately protects the inventor; but the proceeding is difficult, involves additional expense, and must be done promptly. It is probable that raising the standard among the patent office examiners and the cultivation of a fairer viewpoint among them might assist in this matter, but the real remedy is better attorneys. Our patent system is the foundation upon which a great deal of our industrial prosperity rests, and the American people should make an earnest effort to correct the manifest abuses that have sprung up in the patent soliciting business.

Any man having a real invention should exercise great care in

committing it to the tender mercies of the average patent lawyer. The good lawyers are not hard to find. They generally have built up a reputation over a long period of years and are known to prominent attorneys, bankers and business men. Only such men should be employed on real inventions, and they charge little if any more than the less competent ones.

The Inventor who Acts as his own Attorney

The inventor can, if he chooses, deal directly with the patent office, and though the old saying that "the man who doctors himself has a fool for a patient" is somewhat applicable, nevertheless it is probable that the average mechanic or business man could prosecute a case before the patent office with as good or better results than an incompetent patent lawyer. In any case the following hints can do the inventor no harm, even if he has a lawyer.

In the first place, it should be recognized that the United States Patent Office gives an inventor a great deal of latitude. It will send him, free of charge, a copy of the Rules of Practice governing the general conduct of its business and the inventor's relations to it. This book looks formidable, but really only the first twenty-eight pages and some of the forms interest an inventor on an ordinary application. If he cannot prosecute an application on this information, he will find that the difficulties he has met with are unusual ones. In addition, every library has Walker, Robinson or Hopkins on Patents, and a few evenings spent in reading the opening chapters will give him an insight into patent theory that is well worth while.

Having mastered the general theory, he can prepare his application. The first thing is the drawings. The Rules of Practice are very specific as to size, etc., and should be followed closely. Here again, the general spirit of fairness to an inventor is shown. The patent office will accept for examination any sort of a drawing that is plain, and will examine and act upon any application that contains such a drawing. Before the patent issues and is printed, however, drawings of the style specified in the Rules of Practice must be furnished by the inventor, or he must pay the patent office for making them; but he can prosecute his patent to final allowance or rejection on drawings that are decidedly not in accordance with the rules.

Having made the drawings, the inventor must write his specification. A sample drawing faces page 68 of the Rules of Practice and the specification for it is given on pages 70, 71 and 72. Pages 12, 13 and 14 explain this specification and the general structure thereof, and it is not hard to prepare a reasonably good one. The petition and oath are given as Forms 1 to 10 and Forms 18 and 19; they are plain and can be copied and filled in directly from the Rules of Practice. The inventor should be careful to fully show and clearly describe his invention, as new matter can not ordinarily be added to either the body of the specification or the drawing after it is once filed.

The specification ordinarily ends with one or more claims which

to the ordinary mortal look like a mere jumble of words. They are a general, concise and exact description of the invention. In all the books on patents and patent law, there has been very little written about the form of claims that will assist an ordinary man in writing them. They are the patent, and it is in writing and changing them to make them allowable that the attorney earns his fee. Years ago, when the writer was an inventor and had never attempted to handle cases, he conceived a great awe for claims. They appeared to be wonderful examples of verbal gymnastics. After having prosecuted many cases for himself and others, the conviction grows upon him that they are mostly a trick. They are simply fundamental ideas wrapped up in verbiage. Some men apparently never learn to write them, others take to it naturally. The best advice that can be given to a prospective prosecutor is to go to the nearest public library and get a late copy of the Official Gazette of the United States Patent Office. Look through the single views and appended claims therein and pick out five or six patents that have a number of claims that are simple and that can be easily understood. Preferably, pick those that are very short, for the fewer the words the better the claim. Send five cents in coin or money order for each patent to the Commissioner of Patents, Washington, specifying the number, date and name of the inventor of each, and he will send a complete copy of the drawings, specifications and claims. Study the form and the way the claims are expressed.

One cannot claim a mode of operation, but only the means by which the mode of operation is carried out. One cannot use as an element in the claim "a shaft moving up and down," but one may say "a shaft, means for moving said shaft up and down," etc. Writing claims is a trick and the main thing to remember is that the more different things a claim may be imagined as describing the better it is. Avoid being definite. Say "means for fastening said pulley to said shaft," instead of saying "a tapered key." In the one case the inventor limits himself to a simple tapered key, and in the other case he covers any means that may be used to fasten the parts together; for example, a set-screw or a tapered pin.

Now wrap up the drawings, petition, oath, specification, claims and filing fee of $15 and send it to the Commissioner of Patents. Take the drawings to a blueprinter and get copies, or the patent office will make them for 15 cents each. Then sit down and wait for from one to nine months for the patent office to act. The examiner may reject all the claims; he may object to the drawings as informal and state that before the patent is printed others must be made; but he must give reasons and he will tell the inventor how to fix them. And when he does act, the inventor has one year in which to answer him, and if the inventor materially amends the claims by a letter to him he has another year after he answers to answer him. Patents may be kept pending for years in this way.

The Commercial Side of Patents

Probably ninety-eight out of every hundred men have, at times, dreams of becoming great inventors. Such dreams are usually colored by visions of some epoch-making discovery which will bring both fame and fortune. As a matter of fact, and according to history, the epoch-making discoveries have made comparatively few fortunes for the inventors. The fortunes have come to others after a long period of improvement, elimination and practical trial. Where there is one Alexander Graham Bell or Thomas Alva Edison, there are a thousand unknown and unremembered inventors. Inventors, as the old saying has it, may be born, but successful inventions are matters of pure business, the gradual evolution of new dresses for old ideas, the working out of new methods, new goods, and new applications to meet recognized trade requirements.

Whereas the large fortunes which have been made by some great and timely discovery or invention can be counted on the fingers, the moderate fortunes which have been made by inventing some small article of practical and everyday use are not only numerous, but are well represented in all sections of the country. To merely invent something is not nearly as hard as knowing what to invent. Nearly any mechanic, if turned loose in a shop, could manage to invent things, but it would only be the occasional and exceptional man who would invent things which had a money value. The really new things or the radical changes are often the ideas of persons who have but a surface knowledge of the business to which their invention applies. Not being bound by custom or by recognized methods or previous experience, they draw upon their imagination or inventive faculty. Lack of practical knowledge often does give that twist to the imagination which results in the new idea, but usually there must be a long period of experiment and the bringing into play of practical knowledge to make the idea successful.

An electric lineman might be employed for twenty years in stringing heavy electric cable, yet his duties seem so commonplace that he never suspects or thinks that a large business could be created in making the clips or hooks which fasten the heavy cable to the supporting wire. The stranger, or possibly the young engineer who has charge of the line gang, being more or less unfamiliar with the work, notices the great number of clips or supports used. He also notices that the lineman cuts off a section of wire for making these clips, and immediately the idea is born as to why these pieces could not be manufactured more cheaply, more uniformly, or better, by machinery.

To successfully follow out such an idea, it is important to understand trade conditions, to know what the possible market would be, what price they would have to be sold at, what saving in labor or cost such article would represent, and after designing a clip which would meet all requirements, to know that a machine could be made for manufacturing such a clip both rapidly and cheaply. The failures

in the invention business have been mostly by reason of the inventor going ahead on some idea which appealed to him personally, but on which his actual information was very small.

So apparently insignificant a product as the hairpin illustrates in a simple manner the development of an idea into an industry. Wild thorns, sharpened sticks and shaped pieces of bone or shell were the original hairpins. Later on, the goldsmiths turned out by hand various devices in the way of bands and pins for holding the hair. The inventor of the wire hairpin is unknown, but the original hairpin was probably a piece of wire bent over in the center to form two straight legs of equal length.

The practical man stepped in, and understanding the various deficiencies of the hairpin as it existed, began to make improvements until today there are dozens of patents covering the point on the pin, the crimping or waving of the wires, the general shape, and other features which presumably make the hairpin better for the purpose intended. From this development, there proceeded the development of machines for manufacturing them. A hairpin made by hand or one requiring considerable manual labor would be a hairpin of rather high cost. As a consequence, the sales would be restricted. With automatic machinery, the hairpin becomes an article where cost is reduced to a mere trifle over the cost of the raw material, and as a consequence, it becomes an article of everyday necessity. A modern hairpin machine, depending upon the size and kind of the pin, will turn out from 75 to 200 per minute. At least one modern hairpin manufacturing company making nothing but hairpins keeps 75 machines running continuously with a general average of 100 per minute or 6000 per hour for each machine.

The improvements, the attachments, and the small changes that make a thing practical, make it conform to the requirements of the trade, and generally whip it into shape, are made by those who are thoroughly familiar with the business in hand and know what will be required by trade usage. There are very few inventions that ever have or ever can immediately revolutionize conditions, trade methods, or things in general. A design or invention that is different beyond a certain point is held up to ridicule as a freak, and regardless of actual merit, it may be years before the public will accept such a design or invention at its true worth.

Wise manufacturers seldom put out freaks, but rather keep to their general design, making small changes here, and others there, until the trade is led to accept a freak as an outgrowth of gradual improvement. Few inventors see the reasonableness or business policy in this. The true inventor would immediately revolutionize business. He forgets the interests of those who have money tied up in a competing article, and would put his invention into the hands of every member of the trade. Admitting that an invention had real and superior merit, this, without previous education, is not a selling point. One shotgun might be so superior to another shotgun that there would be no comparison, and yet there would be no argument that would in-

fluence the man whose knowledge of shotgun requirements could not grasp the technical difference. To him they would both be shotguns.

To the general public, inventions that are radically new are things to let the other fellow fool with. This characteristic of the public will account for about one-half of the failures of inventors to put a really meritorious article on the market. The inventor, therefore, to be successful in a financial way, should be a business man. He should be broad in mind, and willing to see things as they exist, and not as he would have them. He must recognize that all things must be manufactured, and to be of any pecuniary benefit, they must be sold. To be sold, a product must adhere more or less to certain well defined standards. Such standards can be gradually altered, but they cannot be rushed at and immediately overthrown. In addition, to be manufactured at a cost which will admit of selling at a price which will be acceptable to the public and yet admit of a profit, special machinery or special applications of standard machinery may be necessary.

Successful invention (and by successful invention we mean invention which brings financial return to the inventor) is a business which requires close study of trade conditions and the possible demand brought about by modern improvement. The man who invents a garter clasp or a new type of hairpin, and can get them on the market in a proper manner, stands a better chance of being adequately rewarded than he who struggles for many years in an effort to build some type of a great power turbine.

There have been fortunes made on pins and other fortunes on hooks and eyes, but such fortunes have been built through a universal demand that called for quantity, and the popularity of these goods and immense sales for them have been created by reason of their very small retail cost. This low cost is made possible by automatic machinery that takes the wire or metal from a reel, feeds it through the machine, and drops out the completed article. Without such machinery, neither the pin business nor the hook and eye business would be possible, and the general public would still be using the makeshifts of our ancestors.

The inventor of the hook and eye or the inventor of the pin probably could not design a machine for making them, and they must perforce go to other inventors who could build one for them. Like thousands of other things, the hook and eye was an idea. Properly made and properly put on the market, it was a builder of fortune, but it required the machinery back of the hook and eye to make such an idea successful.

The Part Played by Special Machinery

The machine part of the proposition is really the fundamental basis for success. Fish-hooks would still be made by hand and at home by those who use them were it not for the automatic machines which turn them out so rapidly and at so low a cost that it would be a foolish waste of time and energy for anyone to attempt competition by older methods, even for their own use. The dollar watch is made possible

through the design of special machinery. Even the automobile might still be an idea were it not for the machine builders who have made the rapid and uniform manufacture of the various parts possible.

There is practically no industry today where the machines for making some part of the product are not the real factors of success. We hear of the inventor of a typewriter or of some other product, but we never hear of or give a thought to the inventor of special machines and special attachments which make the manufacture of the typewriter or product possible. And in the same way, there are manufacturers of special machinery whose factories are probably unknown to the general business man, yet special machines of their design are in every corner of the world, and turning out completed products or parts for pretty nearly every line of business.

Work which is done by hand represents labor charges. It, also, if fairly large quantities are wanted, represents lack of uniformity and interchangeability. High labor charges require a high selling price, and the higher the price, the more restricted the field. Bring machinery into the question, and the labor charges for a single piece drop, the selling price drops with it, the selling field is enlarged, and the greater quantity demanded increases the business and produces a larger net profit. The machine or manufacturing part of a proposition is often lost sight of by reason of the ingenuity shown in a device, or its evident salability. Wrecked hopes are the reward of such short sightedness. The world may be waiting for a device to accomplish a certain purpose, but it will continue to wait if the price is beyond certain set limits.

CHAPTER II

ESSENTIALS OF THE PATENT LAW

The patent statutes of the United States are based upon Article 1, Section 8, of the Constitution, which provides that Congress shall have the power to promote the progress of science and useful arts by securing for limited times to inventors the exclusive right to their respective discoveries.

This constitutional provision is the underlying principle of our patent statutes, and shows that the reward of the inventor is not the primary object aimed at, but it is a necessary incident. The framers of the Constitution perceived that the progress of science and the useful arts could best be promoted by furnishing an incentive to make improvements, and that the best incentive is some personal reward or advantage to the inventor. Accordingly an inventor for a certain period is given an exclusive right to his inventions and discoveries; that is, a monopoly. As a consideration he is required to describe and illustrate the invention in his patent specification and drawings so fully and clearly that a person skilled in the industry to which the invention relates can make and use the invention; to the end that after the monopoly has expired, the public will be able to use and derive benefit therefrom. Therefore an inventor applying for a patent must disclose his entire invention, the principle thereof, and the best manner of applying the same. He cannot withhold any part thereof; otherwise the patent will be void. If he wishes to keep the whole or any part of his invention secret, the patent statutes give him no aid. This statement is ventured because the author has been asked to secure patents for inventions which the inventors did not care to disclose fully even to their attorney. Clearly all such efforts are futile.

Patentable Inventions—General Requirements

Patents are issued by the United States Patent Office to any person who has invented or discovered any new and useful art, machine, method of manufacture, composition of matter, or any new and useful improvement along these lines. In order to obtain a patent for an invention, the latter must not have been known or used by others in this country previous to the time the invention was made by the person applying for the patent; nor must it have been described in any printed publication in this or any foreign country before the invention was made by the person applying for a patent in this country, or more than two years prior to the application for a patent. A patent cannot be granted if the article has been in public use or for sale in the United States for more than two years prior to the application for a patent.

A patent contains a grant to the patentee, his heirs or assigns, for a term of seventeen years, for the exclusive right to make, use or sell the invention or discovery throughout the United States. In case the inventor at the time of making his application believed himself to be the first inventor or discoverer, but it is subsequently found that the invention or discovery has been known or used in a foreign country before the time of his invention, he will not be refused a patent providing the article has not previously been patented or described in any printed publication. The application for a patent in this country must be filed within 12 months after an application for a patent has been filed in a foreign country; otherwise, no patent will be granted in this country. In the case of ornamental or other designs, the foreign application must not be filed more than four months prior to the time when the application is made in this country.

These various requirements of the law will now be elaborated upon in detail, each of the more important questions being taken up in turn. As mentioned, patents may be taken out for new inventive compositions of matter; for apparatus or machines; for articles of manufacture, such as a new kind of phonograph record having a different kind of record groove formed on it; and for new processes. Not all processes are patentable. For instance, the mere statement of a law of nature is not. In the patent of S. F. B. Morse for the telegraph, the eighth claim was held void by the supreme court, as being merely for the use of an electric current for marking intelligible signs at a distance. He did not discover the electric current, and claiming just one principle of nature, as he did in that claim, was held unpatentable. If his process, as claimed, had been for the use of several laws of nature, in an orderly manner, to produce a new result, it would have been patentable. The use of a series of steps involving chemistry, light, electricity, or other natural sciences; or of a series of steps, all working to the same end, and which may be performed by hand or by different mechanisms, may be patentable as processes. A case in point is the art of weaving, when it was new. Claims for a machine cover a number of parts which work together to produce a new result. It does not matter if all or some of the elements of the combination are old by themselves. so long as the combination of them is new, and makes a new result, which is not obvious. But if the elements of the claim do not cooperate together, the claim is an aggregation, and unpatentable. For instance, the man who first put a rubber on the end of a lead pencil had his patent declared invalid, since the court said both the pencil and the eraser were old, separately, and they acted separately, whether they were joined together or not.

What is Patentable

The statutes provide for the grant of patents for new and useful arts, machines, manufactures, compositions of matter, improvements, and designs. An explanation of the legal definitions of these various terms, as given by Mr. F. W. Winter in an address before the Engineers' Society of Western Pennsylvania, follows:

Art. The term "art" covers what are ordinarily known as methods or processes, where the improvement consists in the manner or mode of accomplishing the result, as distinguished from the mechanical appliances necessary for this purpose.

Machine. The term "machine" is self-explanatory.

Composition of Matter. The term "composition of matter" covers all mixtures of several ingredients, whether chemical combinations or mechanical mixtures. Soaps, powders, paints, etc., are examples of well-known compositions of matter.

Manufacture. A "manufacture" in the meaning of the patent statutes is anything made by the hand of man and which is subject to manufacture and sale. This term is a broad and elastic one, and the interpretation given to it by the courts bring within it all inventions which cannot properly be classified under the other heads.

Improvement. The term "improvement" in the statutes is largely superfluous, for in a sense every improved device is a new device; or, *vice versa*, most new devices are merely improvements over prior devices. In the history of our patent system there have been but few generically new devices or processes.

Design. The term "design" in the patent statutes has a different meaning from what it has in engineering, where it is often used to mean a new plan or arrangement of mechanical parts for getting new or improved functions. For instance, a new design of motor is a new motor. All such matters in the eye of the patent statutes are subjects for mechanical, and not for design patents. The term "design" in the statutes is limited to matters of ornament or configuration appealing to the aesthetic sense and not to utility; such as a new design for spoons, jewelry, vases, and the like.

Utility

An improvement to be patentable must be useful. This does not mean that the device must be more efficient or economical than prior devices of the same character. It is useful within the meaning of the statute if it is capable of producing a result, and that result is a good one, even though it may not be an advance upon prior devices of the same kind. The degree of utility is not inquired into by the patent office. If a device is incapable of producing any result whatsoever, it is inoperative and not patentable. So, too, if the device is injurious to morals, health, or good order of society, it is not "useful" within the meaning of the patent statutes. Upon this ground the patent office refuses to grant, and the courts refuse to sustain, patents for deleterious compositions and compounds of food products and the like, and for devices which can be used only for unlawful purposes. The more completely such an invention could perform its functions the more objectionable it would be for want of utility. If, however, a device is capable of a good result it is patentable, even though it *may* be used for some unlawful purpose. The evil in such case is not inherent in the invention, but is a fault of the user, for which the latter, and not the inventor, should be punished.

Subject to the exception in regard to the utility of an invention it is a general rule that all changes or improvements, whether mechanical, electrical, chemical, structural, or otherwise, in a method or process, tool, machine, appliance, device, manufactured article or composition of matter in all arts, are patentable, provided they are new and are the result of invention. The statutory classes of invention have been given a sufficiently broad and elastic interpretation to cover the whole range of human activities and industries.

Invention

As to what constitutes invention no general rule can be laid down. There are many improvements which are the natural result of the advancement of an industry which are suggested by many persons whenever the occasion demands. There also are many changes which are merely the expected skill of an ordinary mechanic working in those lines. All such changes are not "inventions" within the meaning of the patent statutes, and are not patentable. In general, invention may be said to consist in bringing forth that which theretofore was hidden to persons skilled in that particular art. The amount of change necessary to constitute invention may be very small, or may be required to be quite radical, depending upon various factors, but principally upon the advantages and results following from the change. If the benefits are very great, and the public and manufacturers are anxious to adopt the improvement as soon as known, it will be held to show that even a very slight change was the doing of something which before was hidden, and hence it is an invention. On the other hand, where there is no marked resulting advantage, the courts require a greater degree of change in order to find the presence of invention.

Novelty

The question of the newness or novelty of an invention is purely one of fact, and one upon which no opinion can be expressed without a detailed knowledge or examination of the art to which the invention relates. Under the statute, an invention is not new if it was:

1. Patented in this or any foreign country before the applicant's invention or discovery thereof, or more than two years prior to the application for patent;
2. Described in a printed publication in this or any foreign country prior to such invention or discovery, or more than two years prior to the application;
3. Known or used in this country prior to such invention or discovery, or
4. In public use or on sale in this country for more than two years prior to the application.

It follows that knowledge or use of an invention in a foreign country does not affect a patent granted in this country, unless such invention was either patented or described in some printed publication. Novelty can be determined only by an examination of all prior patents, publi-

cations, and uses in the same and analogous classes of inventions. This, to be thorough, covers a very wide range.

Term of Patent

All mechanical patents are granted for the uniform term of 17 years. This is not now affected by the existence of any prior shorter-term foreign patents for the same invention, the only requirement being that if a patent is first taken out in a foreign country, the application in this country must be filed within twelve months after the filing of the foreign application. The term of seventeen years can be extended only by a special act of Congress, and this has not been done in any case, and is not likely to be done. In case there is a material error in the patent, or if it is inoperative or invalid by reason of a defective specification or claim, it may be reissued, but such reissued patent will continue in force only for the unexpired term of the original patent. A reissue of a patent is granted to the original patentee, or his legal representatives, if the original specification proves to have been defective or insufficient, or if the patentee has claimed for his invention or discovery more than he had a right to claim as new, so that the original patent is invalid, provided the error has arisen from ignorance or mistake and without any fraudulent or deceptive intention. A reissue application must be made and the specifications sworn to by the inventor, the same as in the case of the original application, providing the inventor is still living. Design patents are granted for terms of three and one-half, seven, or fourteen years, at the option of the applicant. He must make his selection of the term at the time he files his application. It cannot be made thereafter.

Applications for Patents

An inventor who wishes to apply for a patent, and is not familiar with the rules of patent practice, should apply to the Patent Office, Washington, D. C., for a copy of the "Rules of Practice," which will be sent upon request. It is also advisable that the services of a competent and duly registered patent attorney be secured, as the values of patents depend largely upon the preparation of the specifications and the claims. An inexperienced person will often prepare claims which cover only the particular design for the apparatus in which the invention at first may have been executed. The invention, however, may be much more fundamental in character, and the claims should cover all possible designs by means of which the same end may be obtained with the same fundamental principles of action of the device. The patent office, while it will not recommend any particular patent attorney or firm, advises applicants to avoid doing business with those attorneys who advertise the possession of unusual facilities for obtaining patents.

Applications for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the patent office a written description of the invention or discovery, in clear, concise

and exact terms. In the case of a machine, it is necessary to particularly point out and distinctly claim the particular improvement or combination of which the inventor claims to be the discoverer. The specification and claim must be signed by the inventor and two witnesses. When the nature of the invention is such that drawings will make the description clearer, the applicant must furnish a drawing signed by the inventor or his attorney and by two witnesses. If the patent office so requires, the applicant must also furnish a model of convenient size to exhibit advantageously the several parts of the invention, but a model should not be sent unless first called for by the patent office.

The applicant must make oath that he believes himself to be the original and first inventor of the invention or improvement for which he solicits a patent. He must also state of what country he is a citizen and where he resides, and whether he is the sole or joint inventor of the invention claimed. He must also state under oath that the invention has not been patented by himself or others with his knowledge or consent in this or any foreign country, and that an application for a patent has not been filed in any foreign country by himself or his legal representative more than 12 months prior to his application in this country (or four months in case of designs). If foreign applications have been filed, the country or countries where this has been done should be stated, with the date of application. This oath may be made before any person within the United States duly authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, chargé d'affairs, consul or commercial agent holding commission under the Government of the United States, or before any person having an official seal and authority to administer oath in a foreign country. In the latter case, the authority of such person must be proved by a certificate of a diplomatic or consular officer of the United States.

As to the form of a patent, it is made up of a specification, or a describing part; and at the end there is a claim, or usually a number of claims, which state in a very concise way exactly what it is that is protected by the patent. For example, a claim for a new chemical product: "As a composition of matter; a phenol-methylene condensation product containing a halogenated phenolic substance incorporated therewith, substantially as described." You will notice that this describes what the invention actually is, instead of enumerating its advantages, which are stated in the body of the specification.

Fees

Fees must be paid in advance, and are as follows: On filing each original application for a patent, $15. On issuing each original patent, $20. In design cases: For three years and six months, $10; for seven years, $15; for fourteen years, $30. On every application for the reissue of a patent, $30. On filing each disclaimer, $10. For certified copies of patents and other papers in manuscript, ten cents per hundred words and twenty-five cents for the certificate; for

certified copies of printed patents, eighty cents. For uncertified printed copies of specifications and drawings of patents, five cents each. For recording every assignment, agreement, power of attorney, or other paper, of three hundred words or under, $1; of over three hundred and under one thousand words, $2; for each additional thousand words, or fraction thereof, $1. For copies of drawings, the reasonable cost of making them. The patent office is prepared to furnish positive photographic copies of any drawing, foreign or domestic, in the possession of the office, in sizes and at rates as follows: Large size, 10 by 15 inches, twenty-five cents; medium size, 8 by 12½ inches, fifteen cents. Fee for examining and registering trade-marks, $10, which includes certificate. Stamps cannot be accepted by the patent office in payment of fees. Stamps and stamped envelopes should not be sent to the office for replies to letters, as stamps are not required on mail matter which is sent from the patent office. Mail sent to the patent office must, of course, be stamped.

Procedure in Applying for a Patent

To get a patent, the application is prepared and filed in the patent office together with a filing fee of $15. The application consists of a petition; an appointment of an attorney to represent the applicant, unless he wishes to prosecute the application himself, as he has the right to do; the specification, describing the invention clearly and fully in connection with drawings if it is such an invention as can be illustrated by drawings, and having at the end a number of claims, as previously described; and an oath. A patent is a highly technical instrument, and its value depends chiefly on the skill with which it is written and prosecuted before the patent office, and particularly on the way the claims are worded when the patent is finally allowed. Therefore, it usually does not pay to attempt to do without an attorney, or to employ an attorney of doubtful standing or ability.

Only a small percentage of patent applications are allowed as first filed. Generally the officials find some objections against the specification or claims, generally the latter. It frequently happens that a patent is not secured until after repeated considerations. An inventor should therefore not be discouraged because in the first instance his application is rejected. The rules give ample opportunity for overcoming rejections either by amendment or argument, or both, or even appeal to a higher tribunal. But no new or additional matter can be incorporated in an application after it is filed.

The Practice of the Patent Office

To return to the matter of securing the patent, we will assume that the application papers and drawings, with the filing fee of $15, are filed in the patent office. There are forty-odd different examinating divisions in the patent office, in each of which are examiners who examine only certain particular classes of invention, and the application goes to one of these. For instance, if the invention is in wireless telegraphy, it is placed on the desk of a man who spends all his time

in acting on wireless telegraph applications. In a month or more, or maybe less, he reaches the case, reads it, notes certain objections or criticisms, and proceeds to study the claims. He compares these, separately, with his knowledge of what has been done before, and searches the files of patents relating to wireless to find an anticipation for the invention expressed in each claim. He has at his command all the wireless patents of both the United States and foreign countries, and a great many technical magazine articles and books relating to wireless, all classified according to the different subdivisions of the subject.

After his search, the examiner writes a letter, in which he probably rejects some of the claims, in view of certain earlier patents. The inventor, then, through his attorney, studies this action and amends the application, canceling some of the claims, perhaps, changing others somewhat, adding new ones, and arguing that others are all right as they stand. In course of time the examiner answers this, either by allowing the case or by again rejecting certain claims; the attorney answers again, and this process is kept up until either the case is allowed or finally rejected. If this latter happens, the inventor has several appeals permitted him to the Board of Examiners in Chief, then to the Commissioner of Patents, and then to the Court of Appeals of the District of Columbia.

It may happen that the application filed covers the same invention, in whole or part, as other applications of other inventors which are pending before the patent office at the same time. For example, Alexander Graham Bell filed his first application for a patent for a telephone in February of 1876, on the very day that Elisha Gray filed a caveat covering the same general idea. When two or more patent applications are pending before the patent office at the same time, the office determines to which one the patent should be issued by means of a proceeding known as an "interference,"

Several Claimants for Same Invention—Interference

As a result, it is never absolutely certain that a patent can be obtained until it is actually granted. Several parties may apply for a patent on the same invention, and in that case the applications will be put in "interference" proceedings, in which the parties will be required to take testimony to prove who is the first inventor, and the patent will be granted accordingly. The first inventor is the person who first perfected the invention and put it into a form capable of actual use, or, as it is technically known, "reduced the invention to practice." The best evidence of a completed invention is an actual commercial use thereof. But there is a rule that the filing of an allowable application for patent is a "constructive reduction to practice" and has the same force and effect in a contest on priority of invention as an actual commercial use.

While the general rule is that the first inventor is he who first reduced the invention to practice, an exception is recognized in favor of a party who was the first to conceive the invention, but the last

to reduce it to actual practice, provided he was using reasonable diligence in perfecting and adapting the same. What constitutes reasonable diligence depends upon the particular circumstances of each case. The means at the command of a person, his employment, and other surrounding circumstances, his health, the complication of the invention, and cost of perfecting it, are all factors which enter into this question. What the law requires is reasonable, and not the utmost, diligence. But the patent office does not look with favor upon delays, and it requires a good excuse in all cases. The theory is that the party who first adapts an invention for actual use should not be barred by the stale claims of a prior conceiver who has slept on his rights.

Even after a patent is granted another party may file an application for the same invention and be put in interference with the patent. If he is able to prove, by evidence which does not admit of a doubt, that he first completed the invention, a patent will also be granted to him. The patent office, however, cannot call back or annul the patent first granted. It will merely be decided that the patentee was not the first inventor and a patent will be granted to the applicant. The patent office has no jurisdiction over a patent after it is granted except to declare an interference between it and a subsequent application, or to grant a reissue of the patent in case it is invalid or inoperative by reason of a defective or insufficient specification.

Caveat

There is a common misapprehension that a caveat is a short-term patent. On the contrary, it is a mere notice to the patent office that the party has made an invention and wishes further time to mature the same. It continues in force for one year, and it may be renewed from year to year by the payment of the required government fee. If during the term of the caveat, or any renewal thereof, another person files an application for patent for the invention shown in the caveat, the caveat will be notified thereof and will be required to file his application within three months from the time of receiving the notice. The two applications will then be put in interference and testimony will be taken to prove who was the first inventor, and the patent will be granted to such party.

The Right Granted by Patent

All patents give an exclusive right during the term of the patent to (1) make, (2) use, and (3) sell the invention covered thereby. Infringement, therefore, may occur either by making, or by using, or by selling the device. Where one party manufactures a patented device, another party sells it, and a third party uses it, they are each liable for the entire infringement, and the patentee can choose which of the three he will sue, thus being able to select the one most able to respond in damages.

Patent rights extend to all of the United States and territories, but not beyond the same. *Vice versa*, patents granted in foreign countries give no protection in this country. Therefore it is no aid to the protection in this country to also take out patents in foreign countries. The seller or user in this country of an article manufactured abroad will be liable for infringement of any United States patent covering said article.

A patent gives an exclusive right only for that which is distinctly claimed. If no sufficient claim is made, the courts will give no relief, even if the invention is exceedingly valuable. The outmost care should therefore be exercised in drawing the claims of a patent. It is possible to so restrict the claims for a very valuable invention that it will be easy for others to devise forms of apparatus which accomplish the same result but do not infringe the patent. The claims should cover all possible mechanical embodiments of the principle of the invention, so that others, even though they originate new mechanical constructions or combinations, cannot avoid infringement.

Patent claims usually are drawn to combinations of the various elements which constitute the new device. Infringement does not exist unless all elements of the claims are employed by the defendant. In other words, the combination of a claim must be used in its entirety or else infringement does not exist. It is therefore essential that the claims, or at least the broad claim, should contain no element or limitation which is not absolutely essential to the principle of the invention. Brevity in patent claims is desirable.

What Constitutes an Infringement

The claims show what is protected by the patent. It is infringed by any device which one of the claims describes. If the claim has some elements described which are left out of the other device, it is not infringed by it. For instance, a claim for a machine might include a part that had to be moved periodically, and a spring for moving it. That would not be infringed by a machine that left out the spring, and depended on gravity. But it would be infringed if a weight was substituted for the spring, in most cases, as that would be the recognized equivalent of the spring. If the patent stated that it did not matter whether the part was moved by a weight or a spring, or by the positive actuation of another part which was clearly described, and then the claim included broadly "means" for moving the part, it would be infringed by any of these devices.

Patent does not Guarantee that Invention Can be Used

The grant of a patent is no indication that the device covered thereby can be used without infringing prior patents. This is a point upon which much misunderstanding exists. Many persons assume that because the patent office grants a patent, the patentee has a perfect right to use the device covered thereby. This is an error. The patent office does not pass upon the question of infringement, but merely decides whether the applicant has made a patentable im-

provement over prior devices. Most patents cover mere improvements upon prior devices, and it frequently happens that there are still in force prior patents which cover fundamental principles of the device, and which will be infringed by the improved device, if the latter performs the same function by the same or equivalent means.

Therefore as to the question of what protection a patent purports to give, it gives the right to exclude everyone else from making, using, or selling the thing patented, without permission, but it does not, necessarily, give the right to make, use and sell the thing, although it is a very common mistake to think that it does. The inventor may not be able to make, or use, or sell, his own invention—even though he has a perfectly good patent on it—because his invention may be an improvement on an earlier patented invention, and may infringe the claims of the earlier patent. To illustrate: Alexander Graham Bell was granted the first patent in telephones, and this was of an all-embracing character. The courts held that Bell had discovered, and that his patent in 1876 pointed out, the great principle that electrical impulses, induced by the vibrations of a current produced by sound waves, correspond in form and character to the sound vibrations which they represent. This is embodied very broadly in a claim in his patent, as follows. "The method of and apparatus for transmitting vocal or other sounds telegraphically as herein described, by causing electrical undulations similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

In the course of time it developed that this claim was so broad as to dominate the whole telephone industry. Practically, no improvement in the telephone could be used without using Bell's invention and infringing his patent until the end of the seventeen-year life of the patent. It was what is called a pioneer patent. Bell's actual device was crude, of course, and later inventors improved on it and took out patents on their improvements. For instance, Edison invented and patented the carbon transmitter. This was a long step in advance, for Bell's first telephone, using a magneto instrument like the present receiver for both transmitter and receiver, was much too faint. Edison's patent was a pioneer patent so far as transmitters of the carbon, or variable resistance, type go; but it was merely an improvement on the broad invention of Bell, and Edison's transmitter could not be used without infringing the broad claim of Bell's earlier patent, since using the carbon transmitter in any telephone system would cause electrical undulation similar in form to the vibrations of the air accompanying the vocal sounds of the person using the telephone, as claimed by Bell. Therefore, Edison could not use his invention without Bell's permission. Also, neither Bell nor any one else could use Edison's transmitter without his permission. And when later inventors improved on Edison's transmitter, they could not use their improvements without his permission,

if using or making their improvements involved using or making the combination of elements claimed in the Edison patent; and at the same time, neither Edison nor anyone else could use their patented improvements on the Edison transmitter without permission.

All this shows that before buying a patent, or building a plant to manufacture something under a patent, one should first make sure that one is free to use the patented device or process. A good patent lawyer should be employed to make an infringement search.

All patents are *prima facie* valid. They may, however, be invalid for many reasons. The examiners in the patent office are human and liable to error. They also have not available the material for all grounds upon which a patent might be refused or invalidated. Patents can be refused upon publications or descriptions of the invention in scientific and technical journals or books in all languages. The patent office has not files of many publications, and many which they have are not available within the limited time in which the examiner must dispose of a case. So, too, a patent may be refused upon a prior use of the invention in some remote part of the United States, and which may be known to only a limited number of persons. Obviously, the patent office is not in a position to know of all uses.

There are, therefore, many elements entering into the validity of a patent upon which the patent office passes no opinion. A more extended examination through periodicals and prior uses than it is possible for the patent office to make, will frequently show either that the patent is entirely void, or that it must be so restricted that infringement can be avoided.

The Scope of a Patent

The scope or value of a patent, as has already been stated, depends largely on the claims. The claims are broad when it is hard to get around them and narrow when it is easy to get around them. As a general rule, the more details that are set forth in a claim the narrower it is, because competitors can supply other details or leave some of them out, and so avoid infringing. The Bell telephone claim was very broad, because it covered the method and apparatus necessary for telephone communication in its essentials, without being limited to any details. If Dr. Bell and his attorney had not realized the true fundamental scope of his invention, and had claimed it only by its details, it could easily have been gotten around and the Bell companies would not have had the monopoly they did for the life of his first patent. For example, Bell might have claimed "Apparatus for transmitting vocal or other sounds telegraphically, consisting in an electrical circuit, connecting two distant points; a magnet situated at each of said points, the coils of which are included in said electrical circuit; a diaphragm of soft iron positioned to act as a vibrating armature for each magnet; and a mouthpiece in front of each diaphragm, whereby vocal or other sounds impinging on either diaphragm cause electrical undulations similar in form to the vibrations

of the air accompanying the said sounds to pass over the line to the distant coil, substantially as set forth."

That would claim the invention only with respect to the particular means for carrying it out, which Bell had in mind when he filed his application—one main line circuit in which the magnetic transmitting and receiving instruments are placed, the electric impulses generated directly by the sound waves passing over the line. That would not have been infringed by Edison's invention, since his sending instruments are not in the main line circuit at all, as claimed in the hypothetical claim above, but in local circuits with the batteries and primaries of the induction coils; and because Edison's transmitters do not include magnetic coils, but are devices for varying the resistance in the closed local circuit with the battery.

This shows how Bell might have lost his monopoly by claiming his invention too narrowly—that is with too many details in the claim. But he could very well have had some narrower claims, like the one mentioned, in addition to his broad claim, and then if the courts had held that he wasn't entitled to the broad claim, but was entitled to some of the narrower claims, he would have had a monopoly so far as the narrow claims went. Each claim is like a separate invention, and they all have to be considered separately, without reference to each other.

Who May Obtain a Patent

It is essential to the validity of a patent that it be granted on an application signed and sworn to by the original and first inventor or inventors, or by his or their executors or administrators. No other person, even with the consent of the inventor, can sign or swear to an application that will support a valid patent. The patent office has no means of ascertaining these facts and will necessarily be governed by the oath of the application. Should it, however, afterward develop that the party making the application was not the inventor, the patent will be invalid. The fact that a person furnishes capital, machinery, or material for developing the invention, gives him no right to make or join in the application for patent. Such person may acquire an interest under the patent, but this can only be done by an assignment executed by the inventor and transferring to him the whole, or any fractional portion, of the entire right to the invention and to the patent. If such assignment is recorded in time the patent will be issued to the assignee or jointly to the assignee and the inventor, as the case may be.

The builder of a new machine or device is not the inventor if he did not himself originate the ideas or principles contained in such device. In other words, an inventor may employ others to construct and mechanically perfect his invention without losing his exclusive right thereto, and without giving the mechanic who constructs it any right to the patent, unless it has been agreed upon by contract between the parties. Even in that case the mechanic will take his right only by reason of the contract and under a properly executed

assignment. If a person conceives the general plan of an invention and employs another to construct and perfect the same, and the latter under such employment originates improvements which are included in, or, as the court said in one case, are ancillary to, the general plan, such improvements nevertheless belong to the person furnishing the general plan and can be included in any patent for which he may apply.

Joint Inventors

If the invention is really the joint effort of two or more persons, the patent should be applied for in the name of all, since if it can ever be shown that the patent was taken out by less than all the inventors who jointly made it, it is invalidated. An invention is made jointly by two or more people when its conception and working out is the result of their joint effort. One suggests some features and the other, other features; and these different features co-operate in the operation of the complete machine or invention, and both men work out these features together. Joint inventors are entitled to a joint patent, but neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine cannot obtain a joint patent for their separate inventions. If one person furnishes the capital and another makes the invention, they cannot make application as joint inventors. The inventor only can make such application; but they may become joint patentees by means of a deed of assignment.

Joint Owners of Patents

Patents may be owned jointly by two or more parties, and these may have different fractional interests. A common misapprehension is that one joint owner of a patent cannot make, use, or sell the patented invention without the consent of, and without accounting for profits to, his co-owners. This is an error. In the absence of a contract to the contrary, any co-owner of a patent, no matter what fractional interest he may hold, is free to assign his interest in the patent, or to manufacture, use, and sell the patented device, or license others to do so, without the consent of his co-owners and without accounting for any part of the profits. If, therefore, a person owns merely a one-hundredth share of the entire patent right, he may manufacture, sell or use the patented device without the consent of, or accounting for the profits to, the owners of the other ninety-nine one-hundredths. By reason of superior facilities for manufacture, or superior business ability, he may even entirely monopolize the field so as to practically exclude his co-owners from deriving any income whatsoever from their share of the patent. He is nevertheless entirely within his right. The only way this can be prevented is by a properly drawn contract between the co-owners.

Patent Rights Between Employer and Employe

Employes as well as employers are entitled to their own inventions and to patents granted therefor. This right can be modified by con-

tract, but in the absence of a contract to the contrary an employe is entitled to a patent for any invention which he makes, even though it may relate to the business of his employer. If he develops the invention in the time, and at the expense, and with the tools and material of his employer, then the latter will have an implied license or shop-right to use such invention in his business, but he cannot demand an assignment of the patent. Employers who wish to secure inventions relating to their own business, which are made by others while in their employ, should have a contract with the employe. Even with such a contract the employer cannot apply for a patent in his own name, but the patent must be applied for by the employe and assigned to the employer.

Many large corporations employ regular staffs of experimenters and inventors; and most of these concerns have contracts with these employes, which provide that the latter are to assign to the company all inventions made by them in the regular course of their employment. If the employe makes an invention at home, or away from the company's plant and out of hours, or on something not connected with his regular employment with the company, it belongs to him, unless, perhaps, he has contracted absolutely to assign to his company everything he invents for a certain period. If there is no contract, and if the employe has taken out a patent, the employer cannot prevent him from licensing other parties to make, use and sell the patented device, or from selling the patent outright, or from making, using and selling the device himself.

The legal standing of an employe who has developed an invention in the regular course of his employment is quite clearly brought out by the judicial opinion in Fuller & Johnson Co. vs. Bartlett, 68 Wis. 73, a recognized case concerning the relation of employer and employe as regards patentable inventions. The opinion reads:

"The mere fact that in making the invention an employe used the materials of his employer, and is aided by the services and suggestions of his co-employes and of his employer in perfecting and bringing the same into successful use is insufficient to preclude him from all right thereto as inventor. The same is true of an invention conceived wholly by an employer and then perfected under his supervision by the aid of the mechanical skill of his employes. These propositions are sanctioned by numerous adjudications."

"The difficulty with the contrary assumption arises from confounding the machine with the invention which it embodies. Of course there must be a machine that will operate before it can be patented. That implies material, workmanship and skill combined. But such combination, of itself, is not enough to secure a patent. It must also embody an original conception of a new and useful method of doing a specific thing. It is this conception, so embodied, evolved from the inventive faculties of the inventor which constituted the invention in question. The law gave him the exclusive property in it. He still retains it except in so far as he has parted with it or agreed to part with it. The material, workmanship and skill which embodied the invention remain the property of the plaintiff (the employer). The workmanship and skill are both the results of instruction, experience and knowledge. They are acquired by being learned. They may aid and stimulate invention, but are no part of it."

The Federal Supreme Court and other courts have decided, even where one is employed to perfect, improve and to develop new devices, that the employer can acquire no exclusive title to inventions made by the employe in the course of the latter's employment, unless the employe is bound by a specific contract to assign such inventions. (Besides the above noted case see also Hapgood vs. Hewitt 119 U. S. 226; Barber vs. National Carbon Co. 64 C. C. A.; Slemmers Appeal 58 Pa. 155.) If the person who is engaged to improve and to develop new devices is privileged to hold title to such inventions, how much more should the subordinate be entitled to his own inventions and to whatever advantage he may secure through them, when such inventions are made entirely outside of his sphere of action—services not contemplated in his contract of hire.

If an employe really invents something of value to his employer, the latter should not feel that he is being "held up" because that employe invokes his legal rights to secure the best advantage from his creation. If the invention is so important that the employer's operations are literally "held up" for the lack of it, it certainly must be worth something more than the weekly stipend of the employe, which would probably have continued even though no invention had been made. It should be gratifying, at least, that the improvement had been made by an employe rather than by a competitor. An employe who devises an improvement or creates a new output which turns the waste into channels of usefulness is as much entitled to a share in the returns which he has produced as the man who helps a weak concern to its feet by supplying necessary capital.

Marking Patented Articles

The owner of a patent must mark the patented articles plainly with the word "Patented," or similar word, together with the date of the patent, or otherwise give sufficient notice to the public that the device is patented. The failure to so mark will prevent the recovery of damages for infringement occurring prior to actual notice of the patent to the infringer. No person should mark an unpatented article with the word "Patent" or other designation which would leave the public to believe that the article is patented. For each such false marking, with intent to deceive the public, the marker is liable to a penalty of $100. While the application is still pending the manufactured articles can be marked "Patent pending" or "Patent applied for." This will warn the public, and in most cases will prevent infringement.

Foreign Patents

The patent laws of no two countries are the same, and a device which is patentable in this country may not be patentable in foreign countries, and, *vice versa*, devices which are not patentable here may be patentable in some foreign country. In Germany it is difficult to obtain patents, the laws and their interpretation being very strict. Many of the small improvements which are patentable in this coun-

try find no favor under the German law. In other foreign countries, notably Belgium and France, no examination into the novelty or patentability of the invention is made, but the patent is granted as a matter of course. But this does not mean that the patent will be held valid, as it may be overthrown if it is found that the invention was not new in that country at the time the application was made. It is essential, therefore, in these countries that the prior state of the art be thoroughly investigated before the patent claims are drawn.

The cost of obtaining a patent in most foreign countries is greater than in the United States, and the conditions of maintaining the patent are somewhat burdensome. In this country, no taxes or renewal fees are necessary, nor is the patentee even compelled to manufacture the patented device or put it into use. In most foreign countries the patents are subject to annual taxes or renewal fees. These vary in the different countries, being generally quite low the first few years of the patent term, but gradually increasing. Such taxes amount to a considerable sum in the aggregate, and if the patent is not producing a revenue they are a burden. So, too, in most foreign countries the inventor must put the invention to actual use in that country, or at least make such arrangements for manufacturing and so advertise the fact, that any person wishing to procure the patented article can be supplied. The manufacture of the articles in this country and importation into foreign countries does not comply with this provision of the laws of those countries.

In most foreign countries patents must be applied for before corresponding patents are issued in this or any other country. Canada is an exception, as patents can be applied for within a year after the issue of a patent in another country.

CHAPTER III

ACTUAL AND CONSTRUCTIVE PATENT INFRINGEMENT

When entering upon the investigation of a subject at a point in its advanced development, there is a chance that one may reach erroneous conclusions by overlooking some fundamentals amid the intricacies of detail. It is well, therefore, to revert to the primer of patent law in seeking to discover what infringement of a patent is.

The Constitution authorizes Congress to secure for limited times to inventors the exclusive right to their discoveries. As ideas are not susceptible of exclusion from the apprehension of men who chance to perceive them, and as notions of natural justice do not admit of restraining the individual from putting the ideas he receives to innocent use, the exclusive right to a discovery can be secured only by affording inventors the aid of the public force to restrain all others over whom its authority extends from making practical use of the inventor's ideas.

This provision of the Constitution, Congress has sought to carry into effect by enacting that the patent right shall be conferred upon any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, under certain conditions, among others that he shall disclose clearly in writing the nature of his invention, and shall particularly point out and distinctly claim the part, improvement or combination which he claims as his invention or discovery; thereupon the government shall grant to him this right by an instrument under seal known as letters patent, for the term of seventeen years. (Sections 4886 and 4888, U. S. R. S.) This right, which does not exist except as created by statute, having been granted, becomes personal property, like other incorporeal chattels, except that, not being a common law right, it is not enforceable at common law, but only by enactment of the power that created it. Therefore, violations of the patent right, Congress has enacted, shall be remedied in the District Courts of the United States in the first instance, with appeal to the Circuit Courts of Appeal, and, in certain eventualities, in the Supreme Court of the United States, on *certiorari*. Damages for the infringement of any patent may be recovered by action on the case in the name of the owner of the patent; or injunctions may be had according to the course and principles of courts of equity, to prevent the violation of any right secured by a patent.

Nature of Patent Rights

The right secured by a patent, then, is an incorporeal right—a right of action in the U. S. courts to restrain others from making profitable use of the invention without the owner's consent, or for recovering

damages for unauthorized use. It extends no further. All other rights in the property that may result from the invention remain to be adjudicated in the same manner as if this right created by Congress did not exist.

Of the nature of a patent right, the Supreme Court of the United States has thus spoken:

"Whenever this court has had occasion to speak, it has decided that an inventor receives from a patent the right to exclude others from its use for the time prescribed in the statute." (Marshall, C. J., Grant vs. Raymond, 6 Peters, 243.)

"The franchise which the patent grants consists altogether in the right to exclude every one from making, using or vending the thing patented, without the permission of the patentee. This is all he obtains from the patent." (Taney, C. J., Bloomer vs. McQuewan, 14 How., 539.)

"The right to sell [the patented manufacture] was not derived from the letters patent, but it existed and could have been exercised before they were issued, unless it was prohibited by valid local legislation. All which they primarily secure is the exclusive right in the discovery. That is an incorporeal right, or in the language of Lord Mansfield 'a property in a notion having no corporeal tangible existence.'" (Harlan, J., Patterson vs. Kentucky, 97 U. S., 501.)

"Congress by its legislation made in pursuance of the Constitution has guaranteed to him [the patentee] an exclusive right to it [the invention] for a limited term; and the purpose of the patent is to protect him in this monopoly, not to give him a use which save for the patent he did not have before, but only to separate to him an exclusive use." (Brewer, J., U. S. vs. Bell Telephone Co., 167 U. S. 224.)

Thus Mr. Justice Miller before elevation to the Supreme Court:

"It is to be observed that no constitutional or statutory provision of the United States was or ever has been necessary to the right of any person to make an invention, discovery, or machine, or to use it when made, or to sell it to some one else. Such right has always existed and would exist now if all patent laws were repealed. It is a right which may be called a natural right, and which so far as it may be regulated by law belongs to ordinary municipal legislation, and it is unaffected by anything in the Constitution or patent laws of the United States." (*In re* Brosnahan, 18 Fed. Rep., 62.)

Proper Tribunals for Cases Involving Patented Articles

Remedies for wrongs against patented property, then, may be had by the same procedure and in the same tribunals as remedies for wrongs against unpatented property; but wrongs against the "property in the notion," the right of exclusion, which is an artificial right created by Congress, may be remedied only in the way and by the tribunals designated by Congress. When one patents an invention, he has all the rights and remedies respecting the invention that he had before, and when these rights are invaded his remedy is at common law or equity; but when the government grants the patent, it undertakes, figuratively, to police the industrial territory reserved to him, by preventing others from making, selling and using the patented product without his consent. If no one else attempts to make, use or sell the patented product, the benefits derived from the invention are not augmented by reason of the patent, and wrongs to

the property of the inventor may be redressed by the ordinary machinery of the law; but when others seek without authority to make, use and sell that product, thus encroaching upon the reserved territory, the government steps forward and, as it were, ejects them.

A patent right is inconsistent with the natural rights of individuals. It often denies to others the common right of utilizing the products of their independent inventions. Hence, as the patent law confers a privilege that is in derogation of natural right, it should be invoked only to enforce the right that it creates, namely, to restrain others from making, using, and vending without the patentee's consent that which the claim of the patent defines as the thing patented. "The taking away of rights is not favored by the law. Therefore, statutes in derogation of common right are in the construction kept within their express provisions." (Bishop on Written Laws, Sec. 19.)

There is therefore a distinct kind of property in the patent right, injuries to which will be remedied by the U. S. courts in a patent suit; and another distinct kind of property in the industrial process or product to which the patent right pertains, injuries to which will be remedied in the state or other courts wherein violations of rights relating to personal property generally are adjudicated. Each of these two kinds of property rights should be adjudicated in the particular tribunals provided and under the particular laws relating to them, respectively, lest there be danger of confusing the two rights, and a failure of justice, by reason of the application, to one right, of the law that was designed to have application solely to the other.

Infringement of Patents

Infringement, generally, is a violation of a legal right. Infringement, in the language of the patent law, is a violation of the patent right only, and the term is not appropriate, in speaking of patents, to an invasion of those rights which the patentee has aside from the patent. The only persons whose rights can be infringed under the patent law are the owners of the whole or a part of the patent; they are the patentees, and no one else may bring an action for infringement. The owner may be the inventor, or one or more persons to whom he has assigned the patent. A purchaser or lessee of a patented article, or one who has a permission to make, use and vend the patented things, owns no interest in the patent, and has no power to sue for infringement.

Infringement of a patent right consists usually in making the thing patented without the consent of the patentee, and in selling or using a thing so made, or in so using a patented process. The thing patented is that which is defined in the claims. The claims measure the invention. "As the inventor is required to enumerate the elements of his claim, no one is an infringer unless he uses all the elements." (Cimriotti Unhairing Co. vs. American Fur Co., Day, J., 198 U. S., 399.) If one makes, uses or vends without permission the exact combination claimed in a valid patent, he infringes the

patent; also, if without authority he makes, uses or vends that which contains as a part thereof the exact combination claimed; but if he takes only a part of that combination, he is not an infringer.

Contributory Infringement

There is, however, a wrong to patentees known in the patent law as contributory infringement. Prior to 1896 the text books and legal precedents taught that contributory infringement consisted in conspiring with another, or abetting or wilfully aiding another, to make, use or vend an instrument, or to use a process defined in the claims of a valid patent without permission from the patentee.

"An infringement of a patent is a tort analagous to trespass or trespass on the case. From the earliest times all who take part in a trespass either by actual participation therein or by aiding and abetting it, have been held to be jointly and severally liable for the injury inflicted. There must be some sort of concert of action between him who does the injury and him who is charged with aiding and abetting, before the latter can be held liable. When that is present, however, the joint liability of both the principal and the accomplice has been invariably enforced." (Thomson-Houston Co. *vs.* Ohio, 80 F. R., 712, Taft, J.)

Necessarily, an act of contributory infringement presupposes an act of principal infringement by another. One may become liable for contributory infringement by assisting in constructing or renewing a patented combination, by furnishing to one who has no authority from the patentee some of the necessary parts with intent that they shall form a part of the infringing thing. These parts may be common, unpatentable things of general utility, or they may have no known use except in the patented combination. If the parts are of general utility, the person furnishing them must be proven to have had knowledge that they were to be used in constructing the patented thing, otherwise he is no infringer. (Snyder vs. Bunnell, 29 F. R., 47; Bliss vs. Merrill, 33 F. R., 39.) If they have no use except in the patented combination, the infringing purpose of the person furnishing them will be presumed, and he will be deemed a contributory infringer without other proof. (Wallace vs. Holmes, 9 Blatch, 65; Thomson-Houston Co. vs Ohio, *supra;* Alabastine Co. vs. Payne, 27 F. R., 559; Leeds & Catlin Co. vs. Victor Talking Machine Co., 213 U. S., 318, McKenna, J.)

The law of contributory infringement, in substantially the circumstances noted above, must be deemed to be settled, since the U. S. Supreme Court has upheld it in the talking machine case above cited, wherein defendant, charged with making non-patented record disks of a kind particularly adapted to be used as a part of a patented combination comprising the record disk and a reproducing stylus in defined relation thereto, was held to be a contributory infringer. In the opinion it was said:

"A combination is a composition of elements . . . It is, however, the combination that is the invention, and is as much a unit in contemplation of law as a single or non-composite instrument. Whoever uses it without permission is an infringer of it. Whoever contributes

to such use is an infringer of it . . . It can make no difference as to the infringement or non-infringement of a combination that one of its elements or all of its elements are unpatented."

Complicated Questions of Contributory Infringement

Although the law as above set forth is believed to be just, yet nice discrimination is often required to avoid stretching the law to restrict the common right of freedom of trade. Shall not only he who purposely makes and supplies the record disk to be assembled by an infringer with the motor and stylus to make a patented instrument, be liable as a contributor to the infringing act, but also he who furnishes the raw materials with knowledge that they are to be used to make such record disks?

Not only may infringement by a principal infringer be aided by one supplying necessary parts of the patented thing, but also by one providing an instrument with the purpose that it shall be used in practicing a patented process without the consent of the patentee. Thus where a filter was furnished with the intent that it should be used in carrying out a patented process of filtering beer without the patentee's consent, and it was so used, the one furnishing the filter was held liable for contributory infringement of the process. (Loew Filter Co. vs. German-American Filter Co., 107 F. R., 949.) In such a case it must affirmatively appear that the one furnishing the instrument was knowingly a direct accomplice of the principal infringer, and the question is to be decided upon the particular facts of the case, for it cannot be deemed settled that the seller of a common mechanic's tool is guilty of infringement because he knows it is to be used in aiding to practice a patented process.

Case of the Commercial Acetylene Co. vs. Autolux Co.

One may also become liable as a contributor by supplying to a principal infringer an instrument adapted to aid in making a patented article. Here also the liability of him who supplies the instrument depends upon proof of intent to aid the principal in invading the patent right; and the circumstances that the instrument is a common one of general utility, or on the other hand of utility only in the manufacture of the patented product, may have effect one way or another on the liability of him charged as an accomplice. In the case of Commercial Acetylene Co., *et al.*, vs. Autolux Co., 181 F. R., 387, the complainants were the owners of patents granted to Claude and Hess for a package containing acetylene gas. Among the claims of the patents is the following: "A gas package comprising a holder or tight vessel; a contained charge of acetone; a volume or body of gas dissolved by and compressed and contained within the solvent, and a reducing valve applied to an opening extending to the interior of the holder above the level of the solvent." The invention was one of great commercial value. It provided a solution of the problem of safely storing acetylene in large or small

quantities in condition for use as desired. The patent was not for a special tank but for a package of gas held under pressure in solution. An exclusive license to make, use and sell this package in the United States had been accorded to the Prest-O-Lite Co.

According to the text of the decision, one of the original officers and stockholders of the Prest-O-Lite Co. severed his relation therewith for the purpose of establishing a plant for the manufacture of an infringing device, and also for recharging the tanks made by the Prest-O-Lite Co. when the gas had been consumed by the individual users. He was actively engaged in committing direct infringing acts until enjoined by an order of the court, on final hearing, from making the infringing device, which was known as the autogas tank, or committing any other infringing act. The party thus enjoined and his associates then organized a new corporation under the name of the Autolux Manufacturing Co. for the purpose of manufacturing an apparatus known as a high pressure generator, which, the court said, had been extensively used in recharging Prest-O-Lite gas packages and other gas tanks used on autmoboiles.

Now, the Claude and Hess patents contained claims for a receptacle containing gas dissolved in acetone. When the gas had been consumed the combination was destroyed, and whoever again assembled or conspired with another to assemble that combination without the patentee's consent made the patented article and infringed the patent. The receptacle alone was not patentable, but only the receptacle containing the gas in solution. The recharging of the package was as much a making of the patented article as would be the reconstructing of a patented sewing machine, which had been worn out, by taking the unpatentable table, drive wheel, and treadle, and assembling therewith new parts to make a new machine. Although the court made the statement that the generator supplied by defendants was extensively used in recharging Prest-O-Lite *and other gas tanks used on automobiles*, it must have satisfied itself that the maker of these generators intended them to be used in reconstructing Prest-O-Lite gas packages and was guilty as an accomplice of the person who actually procured the recharging of such tanks without the permission of the Prest-O-Lite Co., thus deriving profit by aiding others to do that which the patent reserved to the patentees and their assigns and licensees.

The fact, assumed to have been proven, that the defendant company actively and directly assisted others in reproducing a patented article, was one ground of the decision in the Prest-O-Lite case, and appears to be in accordance with the long established principles of contributory infringement. Another ground of the decision is based upon a more recent extension of the doctrine, to be referred to later.

Summary

It appears, therefore, to be settled that not only he who makes, uses and sells a patented thing without permission from the pat-

entee infringes the patent and may be sued under the patent laws, but also he who actively and knowingly assists in the unauthorized making of a patented thing; and probably also that he who actively and knowingly assists another person in selling or using a patented thing that has come into the possession of that other person *against the permission of the patentee* may be likewise liable under the patent laws. The fact that not all acts that aid more or less directly or indirectly in infringement by another can be deemed to be acts of contributory infringement does not affect in any way the point under consideration, which is that such acts as invade the *patent right* only, raise any question under the patent law. If the allegations of fact are that the act complained of invades the monopoly—narrows the reserved market of the patentee by aiding in the unauthorized manufacture, sale and use of the thing patented, and which the patent reserved to him—the case made is one to be tried under the patent law, because the common law and laws of the states make no provision for property in a right to restrain others from making and dealing in useful commodities, but only the patent laws.

Thus far it has been sought to show, no doubt with some repetition, what right a patent confers, when it is infringed, and where the remedy for infringement lies. It has also been asserted that rights regarding patented property which do not bring into question the patent right to exclude others, have the same adequate remedies under general law as other property rights, and it has been intimated that the adjudication of the one kind of right in the courts provided for adjudicating the other, or the attempt so to do, may result in the inappropriate or inadequate remedy, or none at all.

The Questions to be Decided in a Patent Case

Very briefly may be discussed the tests that may be applied to determine whether an alleged injury to a patentee's rights is an infringement of the patent right. A charge of infringement of a patent puts in issue either (1) the title of the patentee; (2) the validity of the patent; or (3) the identity of the alleged infringing product or process with that claimed in the patent. One charged with infringement may defend by (1) denying the validity of the patent; (2) denying the title of the patentee; (3) denying the identity of the thing alleged to be made, sold or used by him with that defined in the claims of the patent. If, on the other hand, the alleged infringer concedes all these, but alleges an agreement with the patentee or his nominee whereby he was permitted to use the patented thing, a question of contract is raised out of the violation of which the wrong to the patentee, if any there be, proceeds, and which the ordinary law of contract is adapted to remedy. (Wilson vs. Sanford, above; Dale Tile Co vs. Hyatt, 125 U. S., 46 Gray, J.)

If one surreptitiously destroys a patented still, because he deems the manufacturer of alcholic liquor immoral, he does not thereby deny the title of the patentee, the validity of the patent, nor the identity of the still destroyed with that which is patented. The

wrong complained of raises a question for the ordinary criminal law to deal with. So, if the patentee of a butter substitute seeks to sell it in a state the laws of which make the sale of a butter substitute of that character a penal offense, the action of the state in preventing the sale thereof is not a denial of the title of the patentee, the validity of the patent, nor the identity of the substance sold with the patented substance, but is a criminal prosecution and one in which the validity of the laws of the state may be put in issue. (*In re* Brosnahan, above; Patterson vs. Kentucky, above; Webber vs. Virginia, 103 U. S. 344, Field, J.)

If a patentee makes a shipment of patented articles and they become damaged *en route* by the fault of the common carrier or his agents, no question of title, validity of the patent, or identity arises, the injury being a simple tort cognizable in the state courts, or in the federal courts solely on the ground of amount involved, diversity of citizenship, or interstate commerce. If a patentee of a useful article makes a contract with a manufacturer of an inferior article having a similar use, whereby the patentee agrees for a money consideration not to place his article on the market, or license others so to do within the state wherein the manufacturer of the inferior article is situated, no question affecting the validity, ownership or scope of the patent is raised, and the patent law has no dominating influence such as would prevent the courts of the state holding the contract to be one in restraint of trade, and imposing penalties accordingly. (Blount Mfg. Co. vs. Yale-Towne Mfg. Co., 166 F. R., 555.)

The Dick Infringement Case

The deductions made in the previous part of this chapter are not, it appears to the writer, wholly in accord with a number of recent decisions of the circuit courts and circuit courts of appeal, about to be referred to. The original doctrine of contributory infringement which has already been briefly set forth, in a narrow sense imposes restrictions on the public beyond the terms of the patent claims, although in a broader sense it does not, but deems the contributor to join with another in infringing the complete combination claimed. The cases about to be referred to, however, hold as contributory infringers persons who have not conspired with another to make or use, without authority, the patented thing.

The Supreme Court of the United States handed down a decision March 11, 1912, which apparently will have far-reaching consequences in furthering monopolistic control of patented apparatus by the makers. By a decision of four to three it was held that the maker of the Dick patented rotary mimeograph machine has the right to restrict the use of the machine to the supplies furnished by the maker. Chief Justice White in the dissenting opinion pointed out how dangerous the decision may be:

"My reluctance to dissent is overcome in this case: First, because the ruling now made has a much wider scope than the mere parties to this record, since, in my opinion, the effect of the ruling is to

destroy in a very large measure the judicial authority of the states by unwarrantedly extending the Federal judicial power.

"Second, because the result just stated, by the inevitable development of the principle announced, may not be confined to sporadic or isolated cases, but will be as broad as society itself, affecting a multitude of people and capable of operation upon every conceivable subject of human contract, interest, or activity, however intensely local or exclusively within state authority they otherwise might be.

"Third, because the gravity of these consequences which would ordinarily arise from such a result would be greatly aggravated by the ruling now made, since the ruling not only vastly extends the Federal judicial power as above stated, but as to all the innumerable subjects to which the ruling may be made to apply, makes it the duty of the courts of the United States to test the rights and obligations of the parties not by the general law of the land, in accord with the conformity act, but by the provisions of the patent law, even although the subject considered may not be within the embrace of that law, thus disregarding the state law, overthrowing, it may be, the settled public policy of the state and injuriously affecting a multitude of persons."

A Dangerous View of Contributory Infringement

The first of these cases, decided in 1896, is the celebrated Heaton-Peninsular Button Fastener Company vs. Eureka Specialty Company, 77 F. R., 288, reversing the circuit court. Complainant was the owner of a patent for a machine for fastening buttons by stapling them to a shoe. It sold machines, made in accordance with the patent, having attached thereto a plate on which were delineated the following words: "This machine is sold and purchased to use only with fasteners made by the Peninsular Novelty Co., to whom the title to said machine immediately reverts upon the violation of this contract of sale." The fasteners were ordinary unpatented and unpatentable staples, adapted to be fed from a magazine on the machine. They had to be of a size to fit the magazine and were not claimed as a part of the combination patented. Defendant sold such staples to one of the purchasers of a patented machine. No demand for the return of the machine was made thereafter. The court was satisfied that defendant had knowledge of the contract of sale and held him as a contributory infringer, on the theory that although the machine had been sold to the purchaser the use had been restricted, and defendant had conspired with the purchaser to violate the use, the right to impose restrictions being part of the patentee's monopoly.

Another similar case is Cortelyou vs. Johnson, 145 F. R., 932, reversing the circuit court. In this case the patentee of a copying machine known as the "rotary neostyle" sold the machines under a restriction requiring the paraffined paper and the ink used with the machine, both unpatented, and forming no part of the machine claimed, to be purchased from the makers of the patented machine. Defendant was proven to have sold ink to a purchaser of the machine. The circuit court held him as an infringer of the patent, but the circuit court of appeals reversed the court below on the ground that it was not affirmatively shown that defendant had knowledge of the conditions, and the U. S. Supreme Court affirmed the court of appeals.

The Court's Statement of the Conditions

The circuit court of appeals in this case stated its intention to follow the Heaton Peninsular case when the facts were the same, even though "as an original question" they might have ruled differently. The court then points out the embarrassments likely to follow the application of this decision:

"When confined to articles, whether patented or not, which are made for the express purpose of inducing infringement and are not intended for any legitimate use, the doctrine of contributory infringement is logical, just and salutory. But we doubt the wisdom of extending it to the ordinary commodities of life, used in connection with a patented machine, because the patentee sells or licenses the machine upon the condition that he alone is to furnish those commodities. Care should be taken that the courts in their efforts to protect rights of patentees do not invade the just rights of others engaged in legitimate occupations, by creating new monopolies not covered by patents and by placing unwarrantable restrictions upon trade. We think it is clear that the doctrine may be carried far enough to produce such results. For instance, should the patentee of a fountain pen, by such a notice as we have under consideration, be permitted to hold as an infringer one who sells ink to the owner of the pen even though he knows the restrictions? To compel the dealer to make inquiries and take the precautions necessary to save himself from being sued as an infringer would place intolerable burdens upon business. . . . If the doctrine be driven to its ultimate conclusion, the merchant and the consumer may find themselves enmeshed in a network of monopolies embracing all the necessaries of life. No one may safely sell coffee to the consumer but the patentee of his coffee mill, no one can furnish him flour but the patentee of his baking pans, and he may yet be compelled to buy milk from the patentee of his milk can and soap from the patentee of his bath tub."

The Indefinite Meaning of the Law

This is a very forceful statement of the evils of the doctrine; but it alleges no definite legal ground whereby these evils may be checked, and leaves the question to be decided on a consideration of the mere degree of the restraint imposed, or the particular things with respect to which the restraint applies. If the restraint applies to the sale of soap and flour perhaps it may not be sustained; but if it applies to ink or wire perhaps it may be sustained.

In Dick *vs.* Milwaukee Specialty Co., 168 F. R., 930, defendant was held guilty of infringement for selling, with knowledge of a restriction, unpatented ink to be used with a patented copying machine known as a mimeograph. In Crown Cork & Seal Co. *vs.* Standard Brewery, and same *vs.* Greenberger, 174 F. R., 252, the Brewery Co. was held to be an infringer of a patented machine purchased by it under a restriction that only crown seals (not patented) made and sold by the patentee of the machine should be used with it, because it used seals made and sold by another. Here the court said defendant was liable "*even though he buys and pays for the machine and is vested with the legal title thereto*, and its use by him in violation of such restriction is an infringement of the patent." Greenberger, who furnished the crowns, was held guilty of contributory infringement.

In Commercial Acetylene Co. *vs.* Autolux Co., already referred to, the defendant company was held for contributory infringement not only because it aided in reconstructing the patented package, but on the further ground that it had aided in violating a license agreement set forth on a plate secured to the receptacle.

These last cited cases, it will be seen, hold that under the patent laws, although one has bought a machine and paid the full price for it and obtained the legal title to it, he may not use it except in accordance with the wishes of the patentee, if any be expressed, and that the patentee may restrain trade in unpatented supplies used with a patented machine. There are many other cases to the same effect, all based on the decision rendered in 1896 in the case of Heaton-Peninsular Co. *vs.* Eureka Supply Co.

In view of the doctrine of the Heaton-Peninsular case, it has also been held that where a patented machine has been leased on condition that unpatented supplies therefor be purchased from the patentees, it is contributory infringement for a third party to furnish such supplies to the licensee with knowledge of the conditions of use. In Tubular Rivet Co. *vs.* O'Brien (93 F. R. 200), defendant was held liable under the patent laws for supplying to a licensee of a patented machine tubular rivets of a well-known kind in common use, because the license agreement required the licensee to purchase such rivets only from the licensor. Similarly, in Rupp, *et al.*, *vs.* Elliott (131 F. R. 730), one who supplied ordinary wire to be used by a licensee in a patented machine was held to be an infringer.

The Right to Fix Resale Prices on Patented Articles

Another form of ultra-claim infringement, by judicial interpretation, consists in the resale, by a purchaser, of a patented device at a price less than that fixed by the patentee as the resale or retail price. This interpretation of the law is also ostensibly based upon the opinion in the Heaton-Peninsular case. In Victor Talking Machine Co. *vs.* The Fair (123 F. R., 424), one of the leading cases on this point, patented talking machines were sold to a department store subject to a condition appearing on a plate fixed on each machine that they should not be resold at a price less than $25. The department store offered them for sale at $18 each, and on appeal to the circuit court of appeals was held to be guilty of infringement of the patent and enjoined from making any further sales at cut prices. In Automatic Pencil Sharpener Co. *vs.* Goldsmith Bros. (190 F. R., 205), the rule was stated as follows: "The owner of a patent may sell the patented article under restrictions as to the price at which it shall be resold, and is entitled to an injunction to restrain a violation of such restrictions, by one having full knowledge of them, as an infringement of the patent."

In the case of Edison *vs.* Smith Mercantile Co. (188 F. R., 925), the facts, as appears from the decision, were substantially as follows: Patented talking machine records were made and sold by the patentee subject to a restriction on the price at which they were to be resold.

The stock of Edison records in the store of an authorized dealer became damaged by fire. Some cartons containing the records were smoked, others blackened, and others more seriously injured. The stock was abandoned to an insurance company which took it over. The insurance company sold the stock to a salvage company and the latter sold the records in question in the case to the defendant who sold them at retail at less than the resale price fixed by the complainant, the patentee. Defendant was held to be an infringer of the patent for the record. The court remarked with reference to the language of the resale restriction imprinted on the records and the cartons containing them: "Whether the language in question effectively operates in this way after the article has once reached the ultimate user, and has been used, is a question not presented by this record, and which may not be in all material respects the same question as the present one."

There are other cases on the same point decided in the same way; but in the District of Columbia, in an application by the patentees of a medicine known as "sanatogen," for an order restraining a druggist from selling sanatogen at a cut price as an infringement of the patent, the order was denied by the Supreme Court of the District of Columbia without comment. (Bauer Chemical Co. *vs.* O'Donnell, August 4, 1911.)

Review of the Present Conditions

The class of cases of which Dick *vs.* Milwaukee Specialty Co. is a representative, holds that the patent law may be used to restrain trade in unpatented materials to be used with a patented machine which has been sold by the patentee, and legal title to which has passed from the patentee. This ruling nullifies with respect to patented articles the general rule of common law that the owner of a chattel is entitled to the free and innocent use thereof, and appears to nullify the common law, and the state and federal statutes against contracts in restraint of trade, which are, in the language of Mr. Justice Holmes, "contracts with a stranger to the contractor's business (although in some cases carrying on a similar one) which wholly or partially restrict the freedom of the contractor in carrying on that business as he otherwise would." (Northern Securities Co. *vs.* U. S., 193 U. S., 197.)

The class of cases of which Rupp *et al.*, *vs.* Elliott is a representative, holds that the patent law may be invoked to restrain trade in unpatentable materials to be used with a patented machine which has been leased, and likewise appears to nullify to a like extent the laws against contracts in restraint of trade.

The class of cases of which Victor Talking Machine Co. *vs.* The Fair is an example, holds that the patent law may be used to prevent a purchaser and holder of the legal title to a patented article from selling it at a price lower than that dictated by the patentee, thus nullifying to that extent the general rule of law against restrictions on alienation. "If a man be possessed of a horse or any other chattel,

real or personal, and give his whole interest or property therein, upon condition that the donee or vendee shall not alien the same, the same is void, because his whole interest and property is out of him, so as he hath no possibility of reverter, and it is against trade and traffic and bargaining and contracting between man and man." (Hughes, J., quoting from Coke on Littleton in Dr. Miles Medical Co. *vs.* Park & Sons, 220 U. S., 373.)

In the case of Dr. Miles Medical Co. *vs.* Park & Sons, the U. S. Supreme Court held that such a contract with respect to an unpatented proprietary medicine was a contract in restraint of trade, and void so far as it affected interstate commerce. The same court has held that a like contract with respect to the price at which copyrighted books should be resold, is not sustainable as a right conferred by copyright, saying: "To add to the right of exclusive sale the authority to control all future retail sales by a notice that such sales must be made at a fixed sum, would give a right not included in the terms of the statute, and, in our view, extend its operation by construction beyond its meaning." (Bobbs-Merrill Co. *vs.* Strauss, 210 U. S., 339, Day, J.)

In all three classes of cases above, the injury to the patentee was breach of contract, a wrong which the state courts and general law and equity are capable of dealing with, and was not an infraction of a patentee's right to exclude others from making, using or selling the invention, and there was no need therefore to resort to the patent law, and no remedy in the patent law appropriate to the wrong.

What Can be Done to Change the Present Situation?

Ordinary citizens, unlearned in the law, and accustomed to believe that the people, in consenting to the grant of a patent, have consented only to refrain from making, using and selling without permission from the patentee that which is defined in the claims of the patent, evince surprise and resentment when they learn that they may also be restrained by the law from making, using and dealing in ordinary unpatented articles of commerce; from deriving the protection of the general laws against restraint of trade when patented articles are involved; from selling at any price they see fit patented articles that they have bought. They begin to ask themselves whether they are not paying too high a price for the benefits derivable from public encouragement of invention. The people forced the annulment of the registration law of 1793 because of the abuses that grew up under it, and the enactment of the present law in its place in 1836. Since that time industrial conditions have changed. Trusts and corporations established for the purpose of monopolizing trade and manufacture prevail everywhere, and if the patent laws are to be construed to aid restraints of trade beyond those which the people consented to submit to by the grant of patents, the people are likely to demand, finally, their amendment or abolition.

Action in Great Britain

Already the English people have declared their intolerance of any interpretation that shall enable a patentee to monopolize more than the patent grants, urged thereto by practices of American corporations upheld by American courts. The British patent act of 1907 thus declares:

"Sec. 38. (1). It shall not be lawful in any contract made after the passing of this Act in relation to the sale or lease, or license to work, any article or process protected by a patent, to insert a condition the effect of which will be

(*a*) to prohibit or restrict the purchaser, lessee, or licensee from using any article or class of articles, whether patented or not, or any patented process, supplied or owned by any person other than the seller, lessor, or licensor, or his nominee; or

(*b*) to require the purchaser, lessee, or licensee to acquire from the seller, lessor, or licensor, or his nominees, any article or class of articles not protected by the patent;

and any such condition shall be null and void, as being in restraint of trade and contrary to public policy."

Action in the United States

The people of the United States, by their representatives in Congress, are showing their dissatisfaction with ultra-claim restraints enforced under the cloak of patents, as appears from proceedings in the last session of Congress. On May 8, 1911, a concurrent resolution was submitted in Congress resolving: "That a joint committee of both Houses of Congress is hereby created . . . empowered and directed . . . to ascertain the methods of sale, leasing, disposing and control of patented articles in the United States; to ascertain whether patents are used or misused in the establishment of industrial trusts or monopolies; and to investigate all other matters material or pertinent to the purposes of this resolution, and to report their findings to Congress with recommendations as to any needful legislation to protect the public interest and to promote the general welfare."

Among other bills to amend the patent laws introduced in Congress is Senate Bill 2158, "To protect trade and commerce against unlawful restraints and monopolies," providing (Section 8) "that every person engaged in any business, any portion or all of which constitutes a violation of this Act, shall forfeit by reason of such violation any and all rights which such person may have to protection under or right to damages for infringement upon any patent right held or owned by such persons, whether directly from the United States or under purchase, assignment or otherwise; and the right to the free manufacture and use of any and all articles, devices, or machines so held under right of patent by the person who shall have violated any of the provisions of this Act, shall thenceforth be open to all."

House Bill 2930 provides "that whenever any letters patent issued by the United States, or any article, commodity, compound, device, mechanical appliance, or machine protected by patent . . . is owned, leased, used, or controlled by any individual, firm, association, syndicate, corporation, or combination which is engaged in any voca-

tion, business, or enterprise in violation of any law of Congress or of any state, prohibiting, restraining or regulating trusts, monopolies, or combinations in restraint of trade, the right to any protection under the patent laws of the United States shall cease and terminate."

House Bill 8661 reads as follows: "That no owner, proprietor, or beneficiary of any letters patent of the United States covering any tool, implement, appliance, or machinery shall, directly or indirectly, by any means or device whatsoever, make it a condition or provision, expressed or implied, of any sale or lease of, or license to use, any such tool, implement, appliance, or machinery, that the purchaser, lessee, or licensee thereof shall not buy, lease, or use, whether in connection with the operation or use of such tool, implement, appliance, or machinery, or otherwise, machinery, tools, implements, appliances, material or merchandise of any person, firm, corporation, or association, other than such vendor, lessor, or licensor; nor shall any such owner, proprietor, or beneficiary of any such letters patent, directly or indirectly, by any means or device whatsoever, revoke any such sale, lease, or license made by any such owner, proprietor, or beneficiary, on account of the purchase, lease, or use by any such purchaser, lessee, or licensee, of machinery, tools, implements, appliances, material, or merchandise of any person, firm, corporation, or association, other than such vendor, lessor, or licensor: Provided, that nothing in this Act shall be construed to prohibit the appointment of agents or sole agents to sell or lease machinery, tools, implements, or appliances.

"Sec. 2. That any such owner, proprietor, or beneficiary of any such letters patents who shall violate the provisions of this Act, and any other person, whether or not an agent of such owner, proprietor, or beneficiary, who shall wilfully assist in, or become a party to, any such violation, shall be punished for each offense by a fine not exceeding five thousand dollars."

Conclusion

Those who attain to power from the exercise of special privileges are very apt to reach for more. Corporations that have become wealthy through the monopoly of patents have grasped for further monopolies of things not protected by patents, and of things which though patented have been sold, returned their profits, and passed without the monopoly. And in this they have been sustained by U. S. courts, but not yet by the Supreme Court.

If the patent statutes do accord this ultra-claim privilege to a patentee, it is apparent that the people are going to change the statutes. Whether they do accord this privilege or not cannot be deemed settled until the Supreme Court shall have passed upon it. "A question arising in regard to the construction of a statute of the United States concerning patents for inventions cannot be regarded as judicially settled when it has not been so settled by the highest judicial authority which can pass upon the question." (Andrews *vs.* Hovey, 124 U. S., 694, Blatchford, J.)

The question may therefore be regarded as still open to discussion. If the patent statutes do not sustain the patentee's right to put a restraining hand on trade beyond the right to exclude others from making, using and selling the thing claimed in his patent, it would be inadvisable to complicate the statutes by the addition of declaratory sections, and by the possible imposition of drastic qualifications out of sympathy with the spirit of patent law.

A good law by inaccuracy or laxity of administration and interpretation may prove as injurious to the community as a bad law accurately applied. If some things that are done and permitted in the name of patent law are warranted by it, the law ought to be amended, or perhaps even abolished. But if such things are unwarranted by it, the remedy lies in more accurate administration and more careful application. The writer thinks the United States patent law, accurately applied, is, as it was expected to be by its framers, promotive of public welfare. Possibly it may be advantageously amended in minor particulars, but as a body of statutes it is believed to have no superior in its particular field. It would be unfortunate if the greed of those who have been granted special privileges by the patent law, in grasping for further privileges under the cloak of that law, should arouse such resentment in the people as to force hasty and drastic legislation where none is needed. The warning words of Professor Robinson are worthy of heed by all friends of the patent privilege: "Continued concessions to the patentee are as unjust, and ultimately as disastrous, as continued restrictions of his powers; for they constantly give rise to new grounds of litigation and are sure to produce, at some time, a reaction in public sentiment under whose impulse the entire system of exclusive privileges may disappear." (Robinson on Patents, Vol. 1, Section 23.)

MACHINERY'S HANDBOOK

For MACHINE SHOP AND DRAFTING-ROOM

A REFERENCE BOOK ON MACHINE DESIGN AND SHOP PRACTICE FOR THE MECHANICAL ENGINEER, DRAFTSMAN, TOOLMAKER AND MACHINIST.

MACHINERY'S Handbook comprises nearly 1400 pages of carefully edited and condensed data relating to the theory and practice of the machine-building industries. It is the first and only complete handbook devoted exclusively to the metal-working field and contains in compact and condensed form the information and data collected by MACHINERY during the past twenty years. It is the one essential book in a library of mechanical literature, because it contains all that is of importance in the text-books and treatises on mechanical engineering practice. Price $5.00. (£1).

GENERAL CONTENTS

Mathematics—Principal methods and formulas in arithmetic and algebra—Logarithms and trigonometry—Solution of triangles and volumes—Solution of triangles and trigonometrical tables—Geometrical propositions and problems—Mechanics—Strength of materials—Riveting and riveted joints—Strength and properties of steel wire—Strength and properties of wire rope—Formulas and tables for spring design—Torsional strength—Drafting—Friction—Plain, roller and ball bearings—Keys and keyways—Clutches and couplings—Friction brakes—Cams, cam design and cam milling—Spur gearing—Bevel gearing—Spiral gearing—Herringbone gearing—Worm gearing—Epicyclic gearing—Belting and rope drives—Transmission chain and chain drives—Crane chain—Dimensions of small machine details—Jigs and fixtures—Machine tools—Shrinkage and force fit allowances—Measuring tools and gaging methods—Change gears for spiral milling—Milling machine indexing—Jigs and fixtures—Grinding and grinding wheels—Screw thread systems and thread gages—Taps and threading dies—Milling cutters—Reamers, counterbores and twist drills—Treatment of steel—Hardening, case-hardening, annealing—Testing the hardness of metals—Foundry and pattern shop information—The welding of metals—Autogenous welding—Thermit welding—Machine welding—Blacksmith shop information—Die casting—Extrusion process—Soldering and brazing—Etching and etching fluids—Coloring metals—Machinery foundations—Application of motors to machine tools—Dynamo and motor troubles—Weights and measures—Metric system—Conversion tables—Specific gravity—Weights of materials—Heat—Pneumatics—Water pressure and flow of water—Pipes and pipe fittings—Belts and cements—Patents.

The leading journal in the machine-building field, the originator of the Machinery Reference and Data Books. Published monthly. Subscription, $3.00 yearly. Foreign subscription, $3.00.

THE INDUSTRIAL PRESS, Publishers of MACHINERY

140-148 LAFAYETTE STREET NEW YORK CITY, U. S. A.